

BULLETIN OF MISCELLANEOUS INFORMATION No. 3 1938 ROYAL BOTANIC GARDENS, KEW

XIV—NOTES ON A BOTANICAL JOURNEY IN S. W. GREENLAND, 1937.

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At the end of a very full summer of floristic and ecological work in the Julianehaab Distrikt of southwestern Greenland it seems desirable, before publishing in detail in the appropriate journals the results of my various investigations, to give a preliminary report of the more significant or generally interesting observations made.

THE FLORA.

The flora of Greenland has long been of especial interest to scientists in many fields and is now frequently cited in discussions of climatic change, Nordic migration, "continental drift," "persistence" and "land bridges." Opinions as to its origin and relationships have varied from that of Sir J. D. Hooker (1861 p. 252) who called it "purely European," to that of Prof. Eug. Warming (1888 p. 289) who considered it "arktisk-amerikansk." In visiting this climatically most favourable area of the great "continent" it accordingly seemed to me desirable to look out for possible additions to the flora, even if the particular district of my travels is, according to such recent authors as Porsild (1930 p. 5) and Seidenfaden (1933 p. 5) "one of the best botanically explored . . . of Greenland," having been visited by such a "long line of well-trained experts . . . and . . . a still larger number of skilful amateurs" that it "cannot . . . be expected to yield anything surprising in a floristic respect."* Most of these investigators used boats or even ships, traversing large areas and working chiefly at certain fixed points near the shore. It seemed that by taking a small area and studying it more intensively, walking backwards and forwards, alone and living chiefly off the country, it might yet be possible to find new plants. The country and conditions were not always easy, but I was abundantly rewarded for my efforts, finding between or around the heads of the fjords named Agdluitsoq, Igaliko and Tunugdliarfik, all within a radius of 50 kilometres and little more than that distance from

* The late Prof. C. H. Ostenfeld (1928 p. 277) even went so far as to express the opinion that "the floristic part of the research of the vegetation of Greenland has reached its natural conclusion."

Julianehaab itself, no less than nine* species of vascular plants not previously recorded from anywhere in Greenland. These are as follows:—†

Botrychium matricarioides A. Br.

Agrostis tenuis Sibth.

Agrostis gigantea Roth

Danthonia spicata (L.) P. de Beauv.

Carex Mackenziei Krecz ‡

Carex magellanica Lam. (s.l.)

Potamogeton natans L.

Gentiana Amarella L. var. *uliginosa* Wahlenb.

Antennaria compacta Malte

I also know of the discovery this summer, by the Dano-Norwegian Botanical expedition to the same region, of another species new to Greenland.

Five of these new finds belong to well-known major species that are circumboreal or at least widely distributed in more temperate regions on both sides of the Atlantic. But three at least are microspecies that have a restricted distribution, and this is furthermore the case with a greater number of subspecies (varieties) now being studied whose ranges may be of the utmost significance for phytogeographical considerations. If we add to all these some 14 relatively northern species discovered this summer in this most southwesterly region but previously thought to be absent therefrom, although well-known elsewhere in Greenland, we find the known flora of this area, which still stands out as a distinct floristic entity, increased by more than 10% ! This should warn "presence and 'absence'" phytogeographers to investigate some of the *less known* parts of Greenland and elsewhere before theorising further. However, so far as one dare generalise, the present indications are that the flora of southwestern Greenland is, as might be expected from its geographical position, rather more American than European § in its affinities, and, like the vegetation, subarctic rather than truly arctic in type except perhaps on the exposed ocean coast.

* At first I thought this number would be ten, having found a non-viviparous, open-panicled *Deschampsia* which seemed nearer to *D. caespitosa* s. str. (not yet recorded from Greenland except as a recent introduction) than to the usual *D. alpina*. But now reference to early works has made me doubt the validity of the present-day conception of the latter (there does not appear to be any "type" specimen of the original *Aira alpina* L. in preservation) as necessarily viviparous, so that, the *D. caespitosa* complex being moreover quite imperfectly understood, I prefer not to found a new record on my few rather doubtful specimens, but to refer them tentatively to *D. alpina*.

† The determinations have all been checked by specialists in or near the groups concerned. Specimens are to be seen in the Herbarium of the British Museum, who generously supported the expedition. (Some other sets of my Greenland plants, each of about 1000 sheets and representing some 300 species, will soon be available for distribution.)

‡ This is *C. norvegica* Willd. ex Schk. 1801, non Retz. 1779 and 1795.

§ cf. Nathorst (1890 & 1891).

THE MOUNTAINS.

My original plan for the extensive botanical exploration of the alpine regions of the district, in answer to the plea of Porsild (1930 p. 7), proved to be too ambitious, bad weather, including a heavy fall of new snow that extended down to an altitude of about 700 m. (2000 ft.), putting an end to such operations before the middle of August. However, two climbs of about 1400 m. (4500 ft.)* and 1500 m. (4800 ft.) and a number of minor ascents were made under fairly good conditions. As far as one dare draw conclusions from such scanty data it would appear that, in accordance with the subarctic nature of the lowland, the conditions and attendant flora and vegetation of the uplands of southwestern-most Greenland are alpine rather than truly arctic in type. Thus a number of species apparently absent from the lowland but characterising all truly arctic countries, and which it was expected would be found at higher altitudes, failed to appear, while several even of the most ubiquitous plants and chief dominants of higher latitudes which were to be found here and there in the lowlands, where they appeared to be strangers, were of rare occurrence or restricted habitat in the mountains, or even absent therefrom. Again other, relatively southern species, attained quite considerable altitudes here—near or perhaps even at their northern limit.

A remarkable difference in the size of the flora and luxuriance of the vegetation was noted between the only two major mountains climbed under conditions which allowed the taking of botanical observations. On the one no less than 66 species of vascular plants were found between 800 and 1000 m. and 47 between 1000 and 1200 m., while at least 36 species and patches of closed heathy or grassy vegetation extended even above 1200 m. (cf. Polunin 1937a). On the other mountain, similarly situated at the head of a fjord and only about 40 km. away, just 12 species could be found between 800 and 1000 m., 9 between 1000 and 1100 m., and only a single one, *Luzula confusa*, above 1100 m., while no closed communities of any extent were seen above 600 m. !

Important as may be the variations in exposure to "foehn" and other local winds and particularly in the chemical nature and relative stability of surface of the two mountains, they can scarcely account for such extraordinary discrepancies. Some other factor must be called in, and all things considered it is thought most likely that the floristic and vegetational differences noted are due primarily to the very different glacial histories of the two mountains ; for while the upper part of the first was (to all appearances and as affirmed by the experienced glaciologist and geologist Dr. C. E. Wegmann of Schaffhausen) an ice-free "nunatak" throughout the last glacial maximum, the second was isolated and covered with relatively recent morainic material of a type which, even where it exhibits active

* As already reported in detail in a special number (August 1937) of the native journal "Sujumut."

solifluction and other conditions inimical to colonisation, normally becomes vegetated within a very much shorter period than the time which must have elapsed since the final retreat of Pleistocene ice hereabouts. To my great regret it was not possible to make further observations on these most interesting and controversial questions; indeed the area would seem well worth revisiting even for this alone; but it should be pointed out that the above suggestion that vegetational luxuriance as well as floristic composition may perhaps be directly affected by glacial history follows as a corollary to the well-known observations of Fernald (1925), Lyngé (1933), Gelting (1934), Nordhagen (1935), Steere (1937) and many others on the "persistence" of certain species of plants on unglaciated areas. Moreover, colonisation in the North is largely a cumulative process; thus the only vascular plants, the best cryptogam vegetation, and significantly enough the only sign of visitation by birds found in several kilometres of mostly gentle slopes traversed above 1100 m. on the second mountain, were all at the very summit (c. 1500 m.), which from the first had with little doubt constituted the only attractive perching place for miles around.

OLD NORSE RELICS.

The principal ruins of the Eystribygd—the more southern, larger and longer lasting of the two centres of the 10–11th century Nordic colonisation of Greenland—being situated in the region traversed, the opportunity was taken of studying the present-day botanical aspects of such interesting sites as Eric the Red's house and estate "Brattahlíð" (now Qagssiarssuk), the cathedral and bishop's palace at Gardar (now Igaliko), and some of the larger farms.

Although the community flourished chiefly during the first two or three hundred years after colonisation and with little doubt died out completely before the end of the sixteenth century (cf. Jónsson 1928 pp. 346–51), its effect on the vegetation is still very obvious in this region of rather slow growth and small vegetable turnover. Thus the ruins, most of which are now reduced to slight mounds, are almost all overgrown with a grassy sward up to a metre in height and so thick and luxuriant that the birches and willows which dominate most surrounding areas have been unable to attain ecesis in it. The region being one of high precipitation, including heavy summer rains, it seems probable that nitrates are scarce and that this grassy community, which often includes rank herbs, owes its persistence to a high concentration of the less soluble phosphates accumulated from decomposed refuse.

From the surrounding stretches of country all larger birches were liable to be cut for firewood by the Norsemen and where considerable areas were thus cleared the "forest" has generally failed to return. Even further afield, and sometimes many kilometres from any known ruins, the effect is still noticeable of what must have been long-continued pasturing by very considerable herds of domestic animals

—which resulted in the production of a peculiarly equilibrated patchwork of willow or birch scrub alternating with areas of grassland or herb-mat (cf. Polunin 1937b p. 940).

By a careful investigation of peat deposits near ruins, Iversen (1934 p. 349) has shown that in the Vestribygd (the other centre of Nordic colonisation of Greenland) there has been a great increase in the grassiness of the vegetation since the advent of the Norsemen; there was also a marked increase which, however, has not been maintained since the Norsemen died out, in the amount of *Rumex* (all *R. acetosella*) and *Lycopodium* (almost all *L. annotinum*). My observations in the Eystribygd directly confirm these studies, for not only are true grasses dominant in many places around the ruins to this day, and to a degree unknown in ungrazed terrain elsewhere in the Arctic or Subarctic, but in the more limited areas which have been sufficiently grazed during the past few years by the sheep of the modern Greenlanders, it is just the grasses, *Rumex* and *Lycopodium* mentioned by Iversen (1934 cf. figs. on p. 349) which have increased most noticeably in abundance in some at least of the plots investigated.

In the same interesting paper Iversen (pp. 356–8) has propounded the theory, I think with good reason, that a plague of larvae of the moth *Agrotis oculata* was indirectly responsible for the dying out of the Vestribygd population. It is unfortunate that I did not come to hear of this work (which was published in a geological periodical) until after leaving the Eystribygd where, however, during an attempted investigation of the bogs with a piece of broken spade (of such obvious antiquity that the natives said it must be “Old Norse”!) I did not notice any “Puppenschicht.” Indeed it seems likely that some entirely different cause or causes may have been behind the disappearance of the Norsemen from the Eystribygd (cf. Nørlund 1924 pp. 252–9, but see also Nansen 1926 and Polunin 1937b p. 940), where conditions are in many ways different and where the people certainly lived long after the Vestribygd had died out (cf. Jónsson 1928 p. 348). In one bog, with the aid also of my saucepan, a depth of 170 cm. was reached without finding any bottom. The samples brought home for pollen analysis, etc., have not yet been examined, but a feature already noticeable in the field was a great preponderance below 110 cm. of the remains of *Menyanthes trifoliata*, which still grows abundantly around the margins of present-day lakes nearby.

As I have already pointed out elsewhere (1937b p. 940), there seems to be no real evidence for the drastic climatic change which is popularly supposed to have been responsible for the dying out of the Nordic colonies, but many indications that the climate has remained relatively stable since well before their advent, even if there was a “postglacial warm period” lasting until perhaps 2000 years ago.

On the absorbing question of which plants were introduced by the Norsemen from Europe, Ostenfeld (1926 pp. 13 *et seq.*) and Porsild

(1932 pp. 37 *et seq.*) have recently written at considerable length. The former put the "Old Norse" element of the flora at 13%, which altogether seems quite untenable and includes for example *Betula pubescens* s.l. which has since been *proved* to be indigenous (cf. Polunin 1937b p. 940), while Porsild, with his much greater field experience, reduced this quota forthwith to 1.5%. With this I am in much closer agreement; but I would even go a step farther and say that, while it would indeed be remarkable if the old Vikings, during their centuries of lively communication with Iceland, had failed to bring in either accidentally or intentionally at least a few plants therefrom,* it still seems unnecessary to *presume* such artificial introduction for more than two or three of the six species postulated by Porsild (l.c. p. 79). To these two or three plants which may with a fair degree of confidence be assumed to have been introduced from Iceland by the Norsemen it seems necessary to add *Agrostis tenuis*, which I found in 1937 growing in the former home-field (tún) at Igaliko, well away from the present settlement and the ruins of the cathedral but near the famous plants of *Vicia Cracca* and looking similarly well-established in a now heavily pastured area.

Perhaps most fascinating of all is a question which does not appear to have been considered at all seriously before, viz., were any plants introduced to Greenland *from America* by the Norsemen who with little doubt made voyages thereto around the year 1000? It seems probable that they even established colonies on the other side, for we are told that one Erik, a "Greenlander Bishop," went over to "Vinland" as a missionary about the year 1121† (but never returned?); yet all attempts at locating ruins or other relics which would bring us nearer the truth as to who discovered America and where they went have so far failed, even if speculation on the subject has long been rife.

* Once when crossing a wide fjord with some Greenlandish families, stroking a huge rowboat propelled by 8 or 10 oars, I noticed that we were carrying not only several plants of rhubarb, complete with attached soil and weeds "for our friends who have gone to live thereover" but also two whole plants of *Epilobium latifolium*. These were not in flower but the natives nevertheless told me they had brought them "just for decoration" and "because they are rare," doubtless remembering also their gaudy blooms and intending to plant them on the other side of the fjord. These modern Greenlanders, unlike most Eskimos, were living just the life of the old Norsemen, dwelling in stone-and-earth houses and farming cows and sheep, and we were swinging along in true Viking style at a good four knots; does it not then seem reasonable to suppose that the Norsemen frequently brought living plants (as well as seeds and fruits in hay or on clothes) with them, especially when coming from a strange country? All Scandinavians, living as they do close to nature, tend to take more interest in plants than most other people—with the result that there is to-day in Norway, Sweden and Denmark, in spite of the comparative paucity of the flora, probably a greater percentage of botanists than in any other land.

† cf. Jónsson 1928, p. 346.

Since the points even now advocated range from Labrador southwards over the greater portion of the Atlantic coast of North America, it is to be assumed that the indications of the sagas are insufficient even as their botanical information is imprecise (cf. Fernald 1910) ; but it occurred to me that if it were possible to find on or near the ruins in S. W. Greenland any exclusively New World plants having a very restricted distribution on some part of the east coast of America, I might have the best clue of all, especially if several such plants were discovered growing together. As far as species are concerned I may have failed in my quest, most of the major taxonomic entities that could be considered in this connexion having far too widespread a distribution ; but fortunately I was from the beginning able to give special attention to several minor forms and variations. And while much closer study of critical material on both sides of the Atlantic and perhaps even further expeditions will be necessary before a definite pronouncement can be made, I rather think that it will in time be possible to offer at least weighty suggestions as to whereabouts the Norsemen went and where their relics should accordingly be searched for on the American Continent.

THE VEGETATION.

Like the flora, the land vegetation of most of the area investigated is essentially subarctic in type, as became evident long ago from the well-known observations of Rosenvinge (1896 cf. p. 109). Even if the vegetation of the mountains is alpine, as was emphasised above, and that of the outermost skerries and exposed ocean coast shows affinities rather with the arctic regions (for it is continually swept by the East Greenland Polar Current which is generally heavily loaded with pack ice), we have only to penetrate a few miles into the sheltered fjords to find almost everywhere closed plant communities of an intricacy and luxuriance quite unknown in the Far North. The chief of these are birch "forest," willow scrub, mixed heath, grassy pastures, and marshes, while various interesting aquatic and saltmarsh formations cover more limited areas ; the ecology of each outstanding community was investigated and quadrats of typical examples listed.

The birch "forest" is developed only in sheltered valleys around the heads of the fjords, being moreover limited (as I have seen in northern Lapland) to substrata in which the roots of the dominant *Betula pubescens* s.l. can extend well below the 50 or 60 cm. to which the soil is liable to freeze in these most favourable areas in winter (cf. Polunin 1937b p. 939). The "trees" are bushy and gnarled, almost invariably having the lower part of the trunk prostrate or obliquely ascending. They rarely exceed a height of 3-4 metres, even though they may be much longer ; however, a few examples reached 5½ m. in height and had a maximum trunk diameter of 25

cm.* But although these birches rarely grow in closed canopy for more than a few square metres without interruption, and altogether cast rather poor shade, the vegetation which stands between them and the relatively luxuriant terricolous cryptogam investment is generally meagre, consisting of either a straggly lower shrub or a predominantly grassy herbaceous layer.

These areas of apparently climax "forest," even far away from any signs of biotic disturbance, are generally much interrupted by patches of heath or low willow scrub or, on well-drained sandy flats far inland, of lichens and xeric mosses—the local formation being here to a large extent edaphically determined as in the western Great Plains region of North America and some other areas of predominantly dry conditions and more or less extreme continental climate. That lichens instead of dwarf-shrubs dominate the ground layer in many of these areas is with little doubt due to the fact that *Empetrum* and the other "heaths" which characteristically cover large areas farther out towards the sea are killed or persistently "cut back" by *foehn* winds near the ice-cap (cf. also Rosenvinge 1896); the persisting cryptogams alone among the local array of chamaephytes are able to withstand desiccation on substrata which do not allow contemporaneous absorption.

Away from the ice-cap and the very heads of the longer fjords the climate rapidly (and quite noticeably) becomes more oceanic, with a heavy rainfall and less extreme temperature fluctuations. Birches of fair size may persist in places, but the chief dominant is *Salix glauca* s.l., which in sheltered areas forms a thick scrub generally from $\frac{1}{2}$ –2 metres in height, mixed with some lower *Juniperus communis* L. and *Betula glandulosa* Michx. and supporting, at least where not too thick (cf. Rosenvinge 1896 p. 127), a large and variable ground flora. It is here that the best sheep country lies, and it is here that the animals of the Norsemen were responsible for the peculiar patchwork of scrub alternating with areas of grassland or herb-mat which has already been considered above, the whole being comparable rather with the *eastern* part of the Great Plains region of North America, where the local communities are biotically determined (cf. Clements 1920 p. 131).

Thus three main vegetation zones depending upon local climatic conditions are to be seen in the Julianehaab Distrikt as in places further north and most notably in the Franz Joseph Fjord region where, however, the flora and vegetation are very different (cf. Gelting 1934). These zones are:

(1) A limited INNER FJORD ZONE of relatively continental climate whose climax is a birch "forest" at least $2\frac{1}{2}$ m. high.

* Some of these "forested" valleys at the heads of the longer fjords afford the most perfect wintering conditions of pasturage and shelter for reindeer that I have ever seen, and it is to be hoped that some domesticated strain will soon be introduced into this region from which the wild caribou has long since disappeared.

(2) A very broad MIDDLE FJORD ZONE having a damper climate and dominated in favourable and undisturbed areas by willow or mixed scrub from $\frac{1}{2}$ to $2\frac{1}{2}$ m. high. To this belong also most areas between the longer fjords.

(3) An OUTER COAST ZONE of extreme exposure and cool oceanic climate dominated by dwarf shrubs and herbs of chiefly arctic distribution.

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XV—CONTRIBUTIONS TO THE FLORA OF SIAM. ADDITAMENTUM XLVII.*

Quercus lenticellata Barnett, sp. nov.; *Q. oidocarpae* Korth. affinis, sed foliorum costa supra impressa, cupulae lamellis superioribus dentatis, pericarpio tenui intus glabro distincta.

Arbor 15-20 m. alta (ex Kerr). *Ramuli* juniores graciles, rubido-brunnei, glabri, serius conspicue lenticellati; hibernacula globosa, rubido-brunnea, glabra vel puberula. *Folia* tenuiter coriacea, ovato-lanceolata, apice acuminata vel caudata, ipso apice acuto, basi angustata vel acuta vel subrotundata, margine integra vel triente usque dimidio superiore leviter serrata, utraque pagina glabra, supra cinereo-viridia, infra pallide brunnea, 6.1-11.5 cm. longa, 2.1-4.4 cm. lata, costa supra impressa subtus prominente, nervis lateralibus 9-13-jugis supra impressis sed manifestis subtus gracilibus prominentibus marginem versus obscurioribus; petiolus 1.5-2 cm. longus, gracilis, rubido-brunneus. *Amenta mascula* ignota. *Amenta feminea* gracilia, axillaria, valde rugulosa, glabra, circiter 5 cm. longa; bractea late ovata, acuminata, florem saepe aequans, cupulae squamis perianthioque fulvo-pubescentibus, stigmatibus 3 patentibus ligulatis in apicem valde recurvum leviter ampliatis. *Fructus* in rhachi conspicue lenticellata sessiles; cupula crateriformis, basin versus leviter angustata, dimidiam glandem vel ultra obtegens, fusco-brunnea, pube rubido-brunneo subgranulari oblecta; lamellae circiter 8, 4 inferiores fere integrae, superiorum apicibus squamarum plus minus liberis, intus glabrae vel pallide fulvo-sericeae praecipue os versus; usque 2 cm. diametro, 1.2-1.8 cm. alta (extra). *Glans* ovoidea, glabra, nitens excepto umbone prominente anguste cylindrico vestigiis pubis rubido-brunnei granularis induto, circiter 1.7-2 cm. alta, 1.5-2.1 cm. lata,

*Continued from K.B. 1938, 32.

cicatrice primum distincte convexa mox fere plana circiter 1.1–1.4 cm. diametro.

PAYAP. Chiangmai, Doi Lang Ka, *Put* 3775 (type). Doi Angka 700–800 m., in evergreen forest, *Kerr* 5306.

Quercus wangsaiensis *Barnett*, sp. nov.; *Q. semiserratae* Roxb. affinis, sed cupula basin versus magis angustata, lamellis valde prominentibus integrisque, glande anguste ovoidea obliqua differt.

Arbor 15 m. alta (ex *Kerr*). *Ramuli* graciles, demum lenticellati. *Folia* papyracea, elliptico-lanceolata vel suboblanceolata, apice acuminato-acuta, basi sensim angustata acuta, margine triente usque dimidio superiore leviter remote serrata, 10–17 cm. longa, 3.3–5.2 cm. lata, costa subtus robusta supra prominente latiusculaque, nervis lateralibus 10–15-jugis subtus gracilibus sed prominentibus supra elevatis sed subobscuris, utraque pagina glabra; petiolus gracilis, supra plana, 2.2–2.5 cm. longa. *Inflorescentia* mascula haud visa. *Infructescentiae* brevissimae et crassiusculae. *Cupula* lignosa, in basin stipitiformem angustata, leviter pubescens lamellarum quatuor integrarum marginibus crassis exceptis, ore lamellis 3–4 tenuioribus concretis incrassato, intus dense sericeo-brunneo-pubescens, circiter 2 cm. diametro vel paullo ultra, 1.8 cm. alta. *Glans* glabra, fusco-brunnea, anguste ovoidea, supra medium crassior, manifeste obliqua, umbone elongato annulato incluso 3–6 cm. longa, 1.4 cm. lata, cicatrice subconvexa vel plana 0.8 cm. diametro,

NAKAWN SRITAMARAT. Songkla, Ban Wangsai, c. 50 m., by stream in evergreen forest, *Kerr* 15862 (type).

Quercus glabricupula *Barnett*, sp. nov.; *Q. semiserratae* Roxb. affinis, sed foliis minoribus, petiolis brevissimis, nervis e costa angulo acuto ortis, cupula etiam fructuum juniorum intus glabra recedit.

Arbor circiter 15 m. alta (ex *Kerr*). *Ramuli* graciles, glabri, haud conspicue lenticellati. *Folia* ovato-lanceolata usque obovato-lanceolata, acuminata, basi in petiolum brevem sensim angustata, 7–12.5 cm. longa, 2.25–4.75 cm. lata, margine triente superiore serrata, undulata, costa supra elevata, subtus prominente, nervis lateralibus 10–12-jugis gracilibus prominentibus supra elevatis et manifestis e costa angulo acuto ortis; petioli brevissimi, 0.75–1 cm. longi. *Inflorescentia* mascula haud visa. *Spicae fructiferae* breves, fructus usque 3 gerentes. *Cupula* dura, lignosa, pallide fulvo-pubescens, in basin leviter angustata, lamellis circiter 8 supremis 2–3 exceptis eroso-dentatis marginibus glabris, intus leviter sericea, mox glabra, 1.75–2 cm. diametro, 1 cm. alta. *Glans* (immatura?) cupula circiter duplo longior, hemisphaericoglobosa, umbonata, glabra, nitida, brunnea, cicatrice convexa 0.8 cm. diametro. *Glans* quaedam in solo lecta elongata, ovoidea, fere 3.4 cm. longa, 1.7–1.8 cm. lata, cicatrice manifeste convexa 0.8 cm. diametro.

PAYAP. Doi Angka, in evergreen forest, *Kerr* 5295 (type).

Quercus longistyla Barnett, sp. nov.; *Q. semiserratae* Roxb. affinis, sed cupula juniore hypocrateriformi haud turbinata, glande (? immatura) ut videtur magis globosa, foliorum pagina inferiore haud papillosa differt.

Arbor 10 m. alta (ex Kerr). *Ramuli* juniores fulvo-tomentosi, serius glabri, lenticellati. *Folia* juniora fulvo-tomentosa, matura oblongo-lanceolata vel oblanceolata vel ovato-lanceolata, apice acuta vel breviter acuminata, basi angustata acuta, 5-12.5 cm. longa, 1.9-3.4 cm. lata, margine triente superiore serrata, leviter undulata, utrinque glabra (vestigiiis tomenti basi costae subtus exceptis), subpapyracea, costa utrinque prominente subtus robusta, nervis lateralibus 10-12-jugis subtus gracilibus sed prominentibus supra manifestis leviter arcuatis paullo ante marginem incurvis; petioli graciles, supra manifeste plani, usque 2 cm. longi, vestigiis tomenti vestiti. *Amenta mascula* in fasciculis axillaribus disposita, dense tomentosa. *Flores* singuli bractea late ovata suffulti. *Perianthium* scariosum, pilosum, altissime 6-lobum, segmentis linearibus subirregularibus, staminibus circiter 5. *Amenta feminea* circiter 1 cm. longa, dense fulvo-tomentosa, stylis 4-5 longe divergentibus, stigmatibus latis recurvis. *Spicae fructiferae* breves, crassae, circiter 1.5 cm. longae, lenticellatae, fructus 1 vel 2 gerentes. *Cupula* hypocrateriformis, haud turbinata, basi plana, ore lata, glandis apicis umbone longo annulato exserto, lamellis 6-8 obtuse et irregulariter dentatis, dense fulvo-pubescentibus, intus fusco-brunneo-sericea, 1.4 cm. diametro, fere 1 cm. alta. *Glans* (? matura) globoso-ovoidea, brunnea, nitida, circa basin umbonis leviter pubescens, circiter 1.7-2 cm. lata, 2.25 cm. longa, cicatrice plana 1-1.1 cm. diametro.

UDAWN. Loi, Kao Krading, c. 1200 m., evergreen forest, Kerr 8708 (type) and in open evergreen on rocky ground, Kerr 20136.

The flowers have been described from Kerr 20136.

Lithocarpus longispinus Barnett, sp. nov.; *L. lappaceo* (Roxb.) Barnett* affinis, sed foliis glabris nec velutino-pubescentibus, squamis cupulinis gracillimis duplo longioribus (ultra 1 cm. longis) differt.

Arbor gracilis, circiter 8 m. alta (ex Kerr). *Ramuli* gracillimi, glabri, conspicue lenticellati. *Folia* tenuia, papyracea, pallide griseo-viridia, oblongo-lanceolata vel lanceolata, apice oblique acuminato-caudata, ipso apice acuta, basi cuneata, 12.2-20 cm. longa, 3-6.6 cm. lata, margine integra, utrinque glabra, costa gracili supra subtusque elevata, nervis lateralibus gracillimis supra indistinctis et subimpressis subtus elevatis et prominentibus 13-16-jugis usque ad marginem secusque eum arcuantibus, nervis transversis tenuissimis regularibus supra subindistinctis subtus manifestis; petioli graciles, 0.8-1 cm. longi. *Spicae floriferae* haud visae. *Spicae fructiferae* axillares, graciles, usque circiter 8 cm. longae, fructus 1-3 terminales gerentes. *Cupula* globoso-hemisphaerico-

* Comb. nov.

conica, glandem omnino obtegens, circiter 2.5 cm. alta, 2 cm. lata, tenuis, spinis longis gracilibus glabris simplicibus apice uncinatis 1.3 cm. longis obsita. *Glans* hemisphaerica, pallide fulvo-sericeo-pubescentis, 1.9 cm. diametro, 1.2 cm. alta, levissime apiculata, cicatrice concava 1.1 cm. diametro.

PATTANI. Kao Kalakiri, c. 300 m., in evergreen forest, *Kerr* 7755 (type).

***Lithocarpus recurvatus* Barnett**, sp. nov.; *L. Garrettiano* (Craib) A. Camus affinis, sed foliis haud oblanceolatis subtus haud fulvo-pubescentibus pilis magis adpressis differt.

Arbor circiter 15 m. alta (ex *Kerr*). *Ramuli* juniores graciles, rubido- vel cinereo-brunnei, subglabri, tandem glabri. *Folia* elliptica vel elliptico-lanceolata, saepe obliqua, apice caudata, basi acuta, 10–16 cm. longa et ultra, 2.2–4.7 cm. lata, pergamentacea, supra glabra, brunnea, subtus pilis crebris adpressis pallide argentea, nervis lateralibus gracilibus circiter 15–17-jugis rectis vel leviter arcuatis prope marginem arcuatis subtus prominentibus brunneis supra indistinctis, nervis transversis supra haud visibilibus subtus valde indistinctis, margine integro. *Inflorescentia mascula* non visa. *Spicae fructiferae* (delapsae) ultra 20 cm. longae, robustae, 7.5 mm. diametro. *Cupulae* ternatim sessiles, juniores glandem praeter stylos 3–4 erectos obtegentes; squamae elongate acute spiniformes, 6–7 mm. longae, superiores erectae apice incurvae, inferiores valde recurvae. *Glans* matura hemisphaerica, cupula usque duas partes oblecta, pallide brunnea, glabra, cicatrice basali circiter 1.5 cm. diametro. *Cupula matura* ore circiter 1.5 cm. diametro, 1.3 cm. alta.

PAYAP. Doi Angka, c. 1400 m., in open evergreen forest, *Kerr* 5340 (type).

***Lithocarpus intermedius* Barnett**, sp. nov.; *L. spicato* (Smith) Rehd. et Wils. atque *L. fenestrato* (Roxb.) Rehd. affinis, a priori foliis subtus breviter pubescentibus, nervis lateralibus a costa angulo acutiore ortis, squamis cupulinis vix lamellatis haud umbonatis apicibus acutis liberis, a posteriore stylis brevibus, glandis cicatrice lata manifeste concava, cupulae squamarum apicibus brevibus haud reflexis distinguenda.

Arbor 15–20 m. alta (ex *Kerr*). *Ramuli* fusco-cano-puberuli, serius minute lenticellati. *Folia* coriacea, elliptico-lanceolata vel ovato-lanceolata, apice acuminato-caudata, basi cuneato-acuta, margine integra, undulata, supra glabra, juniora cinereo-viridia, serius magis brunnea, subtus pallida, minute pubescentia, 8.8–24 cm. longa, 2.4–6.9 cm. lata, costa utrinque elevata, nervis lateralibus 11–17-jugis leviter elevatis supra manifestis usque indistinctis subtus prominentibus usque ad marginem leviter arcuatis vel rectis ibique abrupte curvatis; petioli supra plani, 1.3–1.8 cm. longi. *Spicae* erectae, in fasciculos axillares vel paniculas terminales dispositae, graciles, pallide fulvo-pubescentes, usque 11 cm. longae, mere masculae vel basi femineae apice masculae.

Flores masculi in fasciculos densos dispositi, bractea longe acuminata ; perianthii segmenta 3 + 3 ; stamina 12, 6 exteriora perianthio adnata, interiora jugo infra pistillodium magnum hirsutum sito adnata ; staminum juniorum filamenta crassa, serius gracilia. *Flores feminei* in fasciculos 3-flores subremotos ut masculi bracteatos dispositi ; styli erecti, breves, haud 1 mm. longi ; stamina parva suppetentia. *Spicae fructiferae* usque circiter 18 cm. longae, robustae, minute lenticellatae, crebre fructiferae ; fructus abortu singuli vel binatim ternatimve plus minus concreti. *Cupula* junior glandem glabrum nitentem usque duas partes vel ultra obtegens, matura hypocrateriformis circiter 0.7 cm. alta, ore tenuis circiter 2 cm. diametro, squamis imbricatis late ovato-triangularibus basi concretis arcte adpressis apicibus acutis liberis. *Glans* hemisphaericoglobosa, minute apiculata, circiter 2–2.5 cm. diametro, 1.5 cm. alta, cicatrice altiuscule concava circiter 1.5–1.6 cm. diametro.

PAYAP. Chiangmai, Doi Sutep, 900 m., in evergreen jungle, *Kerr* 3439 ; Me Teng, 700 m., mixed deciduous forest, *Kerr* 6483 (type).

PUKET. Ao Luk (Krabi), 50 m., evergreen forest, *Kerr* 18560. Talang, 200 m., evergreen forest, *Kerr* 17452. Takuapa, Bangwan, c. 10 m., scrub, *Kerr* 17084.

King refers specimens of this species from Maymyo, Burma, to *Quercus fenestrata* Roxb. He says, " In a few (i.e., specimens of *Q. fenestrata*) the upper third, and in an extremely small number the upper half, of the glans is naked. The latter somewhat resemble the fruit of *Q. spicata* Smith."

For the reasons given above I think this is definitely a distinct species, although it has undoubtedly affinities with both *fenestrata* and *spicata*.

Lithocarpus rufescens Barnett, sp. nov. ; *L. Falconeri* (Kurz) Barnett* affinis, sed foliis multo minoribus, nervis lateralibus gracilibus supra indistinctis, glande magis globosa apice depressa manifeste rubro-granulari-pubescente nec glabra differt.

Arbor circiter 15 m. alta (ex *Kerr*). *Ramuli* juniores graciles, costati, rubro-brunneo- et cinereo-pubescentes, serius glabri lenticellati. *Folia* anguste elliptica vel leviter oblanceolata, interdum obliqua, apice acuta vel leviter acuminata, in basin acutam angustata, papyracea, margine integra, 9.9–16.2 cm. longa, 3.2–4.4 cm. lata, supra pallida glabra, subtus vestigiis sparsis pubescentiae rubrae fere lepidotae induta, demum glabrescentia, nervis lateralibus gracilibus, circiter 13-jugis, manifeste ante marginem arcuantibus eique parallelis percurrentibus, apicalibus arcuatim anastomosantibus, subtus prominentibus, supra indistinctis, nervis transversis utrinque indistinctis ; petioli usque 0.9 cm. longi, sicut ramuli rubido- et cinereo-pubescentes. *Spicae masculae* in ramulis junioribus axillares, graciles, ramosae, griseo-pubescentes, foliis breviores. *Flores* ternatim crebre aggregati ; bractea triangularis, basi crassa, in acumen tenue attenuata, apice brunnea, extra pubescens ;

* Comb. nov.

bracteolae 2, parvae, scariosae, triangulares, breviter apiculatae; perianthii segmenta 6, crassiuscula, extra hirsuta; stamina 12, antheris parvis rotundis rubro-brunneis; pistillodium magnum, hirsutum. *Flores feminei* haud visi. *Fructus* in rhachi robusta simplici sessiles, plerumque singuli, interdum fructus immaturus cum cupula matura concretus; cupula junior glandem (praeter stylos divergentes) obtegens, circiter 1 mm. longa; cupula matura hemisphaerica, circiter tertiam partem glandis obtegens, rubido-granulari-pubescent, squamis late ovatis acutis griseo-pubescentibus, ore tenui circiter 1.8–1.9 cm. diametro, circiter 1 cm. alta. *Glans* rubido-brunneo-puberula, globoso-ovoidea, 2.1 cm. alta, 2.2 cm. lata, apice leviter depressa, brevissime apiculata, cicatrice plana circiter 1.2 cm. diametro.

PATTANI. Bachaw, c. 50 m., in evergreen forest, *Kerr*, 7218 (type).

Lithocarpus Craibianus *Barnett*, sp. nov.; *L. fenestrato* (Roxb.) Rehd. et *L. truncato* (King) Rehd. et Wils. similis, a priori foliis densius pubescentibus, cupula crassiore, glande pubescente et cicatrice multo majore, a posteriore fructu globoso magis quam turbinato, glande conica apice haud applanata, cicatrice pro rata minore, differt.

Arbor parva vel mediocris, 6–10 m. alta (ex *Kerr*). *Ramuli* robusti, costati, fusco-griseo-pubescentes, serius glabri lenticellis conspicuis irregulariter aggregatis. *Folia* coriacea, elliptica vel elliptico-lanceolata vel ovato-lanceolata, apice acuminata vel caudata, basi angustata acuta vel subrotundata, 12–16.5 cm. longa, 3.6–5.3 cm. lata, margine integra, supra glabra plus minus nitida siccitate plus minus rubido-brunnea, subtus pallida dense sed breviter pubescentia, costa utrinque elevata prominente, nervis lateralibus 11–14-jugis supra leviter elevatis vel impressis subtus rubido-brunneis prominentibus marginem versus arcuatis ibique procurvis apicem folii versus arcuatim anastomosantibus; petioli 1.3–2 cm. longi. *Spicae masculae* fulvo-pubescentes, graciles, axillares, breviusculae; flores plerumque ternatim aggregati, bractea triangulari longe acuminata, perianthio 6-lobo extra pubescente intus sparse hirsuto, staminibus circiter 12 filamentis longis antheris parvis globosis, pistillodio magno villosa. *Spicae femineae* robustae, fulvo-pubescentes, axillares vel in paniculas terminales pauciramosas dispositae, interdum flores paucos masculos cum glomerulis femineis interspersos gerentes. *Flores* ternatim aggregati, bractea late ovata acuminata, stylis 3 circiter 1 mm. longis divergentibus. *Cupulae juniores* glandem praeter stylos exsertos includentes, singulae vel binatim ternatimve conetae, squamis circa os distinctis acuminatis incurvatis. *Cupula matura* globosa vel globoso-conica, glandem includens, saepe rubida, crassiuscula, intus praecipue apicem versus sericeo-pubescent, circiter 1.7 cm. alta, 1.4 cm. lata. *Glans* (matura?) conica vel hemisphaerico-conica, cano-puberula, cicatrice dimidia glandis altitudine.

PAYAP. Chiangmai, Doi Suteh, 1500-1700 m., in open grassy jungle, *Kerr* 140 (type), 708.

Lithocarpus pattaniensis *Barnett*, sp. nov.; affinis *L. encleisocarpo* (Korth.) A. Camus, sed foliis coriaceis, nervis lateralibus numerosioribus haud arcuatis, nervis transversis distinctis regularibus parallelis, fructibus magis turbinatis in basin angustatis, floribus masculis plerumque singulis differt.

Arbor circiter 20 m. alta (ex *Kerr*). *Folia* ovato-lanceolata, ovata vel leviter obovata, coriacea, abrupte caudato-acuminata, 9-17 cm. longa, 4.7-7.5 cm. lata, supra glabra, nitida, fusco-rubido-brunnea, subtus pallida, breviter fulvo-pubescentia, costa utrinque elevata, nervis lateralibus 11-12-jugis supra leviter elevatis subtus prominentibus, nervis transversis distinctis arcte parallelis; petioli graciles, usque plus quam 2 cm. longi. *Spicae* in paniculas terminales vel axillares dispositae, pallide fulvo-pubescentes, usque 12 cm. longae; flores masculi singuli vel raro bini ternive; bractae 3, centralis lanceolata acuta, laterales ovatae acutae, omnes crassiusculae; perianthium alte cupulare, circiter 0.25 cm. altum, usque circiter tertiam partem 6-lobum, extra leviter cano-pubescent, intus pilosum; stamina 12, filamentis longissimis circiter 0.9 cm. longis circiter dimidio inferiore applanatis, pistillodio magno fulvo-villoso fere aequae alto ac perianthium. *Spicae femineae* ut masculae pubescentes; flores singuli, bractea minima lineari acuta; perianthium 6-lobum, recurvatum; styli breves, erecti, ultra perianthium circiter 0.6 mm. tantum exserti, plerumque 6. *Spicae fructiferae* puberulae, usque 12 cm. longae, 0.5 cm. diametro, lenticellis brunneis valde inconspicuis. *Fructus* singuli, pedicello circiter 0.5 cm. longo. *Cupula* (? matura) globoso-turbinata, in basin angustata, glandem praeter umbonem exsertum obtgens, lamellis valde obscuris et irregularibus, tenuis sed haud papyracea, 1.5 cm. alta, 1.8 cm. lata. *Glans* hemisphaerico-conica, distincte apiculata, laete fulvo-sericeo-pubescent, cicatrice alte concava.

PATTANI. Betong, Gunong Ina, c. 1100 m., in evergreen forest, *Kerr* 7583 (type).

Lithocarpus aggregatus *Barnett*, sp. nov.; *L. encleisocarpo* (Korth.) A. Camus var. *aperto* (King) A. Camus affinis, sed foliis coriaceis, nervis lateralibus e costa angulo acutiore exortis ad marginem recte percurrentibus, nervis transversis regularibus parallelis, spicis fructiferis lenticellis magnis albis conspicuis instructis, cupula crassa nec papyracea, glandis cicatrice magna convexa vel fere plana differt.

Arbor sempervirens, 12-30 m. alta (ex *Kerr*). *Ramuli* juniores graciles, lepidoto-pubescentes vel glabri, serius conspicue lenticellati. *Folia* coriacea, elliptico-lanceolata vel ovato-lanceolata, apice acuminata, basi cuneata, 9.2-12 cm. (et ultra) longa, 3.5-8.1 cm. lata, supra rubido-brunnea plus minus nitida, subtus dense

cano-pubescentia, costa utrinque prominente, nervis lateralibus 9–11-jugis supra elevatis subtus prominentibus ad marginem recte percurrentibus ibique distincte curvatis, nervis transversis distinctis regularibus parallelis; petioli graciles, 1·5–2 cm. longi. *Spicae floriferae* haud visae. *Spicae fructiferae* crassissimae, circiter 0·8 cm. diametro, breves, usque circiter 8 cm. longae, conspicue lenticellatae; fructus stipati, abortu singuli vel saepius bini ternive in pedunculo communi 0·5–1 cm. (et ultra) longo dispositi. *Cupula junior* glandem (praeter umbonem cum stylis 3 brevibus usque 0·5 mm. longis exsertum) obtegens. *Cupula matura* breviter cupularis, dimidium glandem obtegens, margine super glandis apicem incurvo, lamellis distinctis 5 basin versus subdistantibus compluribus circa os plus minus concretis, crassa, extra cano-pubescentia, intus glabra, circiter 2·2 cm. diametro, 1·1 cm. alta. *Glans* hemisphaerica, apice conica, apiculata, stylis persistentibus brevibus divergentibus, 2·5 cm. diametro, 2 cm. alta, cicatrice convexa vel plana fere 2 cm. diametro.

PAYAP. Doi Angka, c. 2100 m., in evergreen forest, *Kerr* 5301; Doi Sutep, 1200–1500 m., common in evergreen jungle, *Kerr* 3364 (type).

Castanopsis purpurea *Barnett*, sp. nov.; *C. armatae* Roxb. affinis, sed foliis crassius coriaceis subtus breviter pubescentibus, nervis lateralibus numerosioribus (in *C. armata* 6–8-, in hac specie 10–12-jugis), cupula subpedicellata spinis longioribus, glandis cicatrice haud ultra tertiam partem glandis maturae expansa differt.

Arbor circiter 20 m. alta (ex *Kerr*). *Ramuli* glabri, purpurascetes, manifeste lenticellati; gemmae hiemales ovoideo-globosae, perulis exterioribus glabris late ovatis rotundatis. *Folia* coriacea, elliptica vel elliptico-lanceolata vel ovato-lanceolata, breviter acuminata ipso apice subrotundata, basi cuneata vel rotundata, margine integra, 12–23 cm. longa, 4·7–5·1 cm. lata, supra glabra, obscure viridia, plus minus nitida, subtus puberula pilis brevissimis fulvis, costa supra leviter elevata subtus prominente, nervis lateralibus gracilibus supra subtusque elevatis circiter 10–12-jugis usque ad marginem sensim curvatis secusque eum ramosis atque arcuatim anastomosantibus, nervis transversis irregularibus supra manifestis subtus subindistinctis. *Spicae masculae* paniculatae, floribus ternatim aggregatis et bractea lata suborbiculari et bracteolis 2 minoribus et squama adaxiali cinctis; perianthium alte 6–7-lobum, lobis obovatis ciliatis, staminibus 12–14, pistillodio parvo alte lobato. *Spicae femineae* simplices, manifeste rugulosae, fulvo-pubescentes, usque 20 cm. longae, floribus dissite ternatim aggregatis, bractea lata ovata acuminato-acuta subtus pilosa, squamis cupulinis et perianthio tomentosis, stylis 3 brevibus circiter 0·5 mm. longis. *Fructus* globosus, obliquus, breviter pedicellatus, pedicello incluso circiter 3·5 cm. altus, circiter 3–4 cm. latus cinereo-pubescentia, spinis robustis ramosis in verticillos 3–4

irregulares dispositis apice pallido glabro excepto pubescentibus 1-1.5 cm. longis; nuces 1-3, ovoideae vel complanatae, apice rufo-pilosae, inferne glabrescentes, circiter 2.2 cm. diametro, cicatrice magna convexa basali circiter 2.1 cm. diametro.

PUKET. Trang, Sikao, under 50 m., light evergreen forest, *Kerr* 19011 (type); Satul, under 5 m., *Kerr* 13675.

Flower description from *Kerr* 13675.

XVI—NOTES ON CAREX: III.* E. NELMES.

THREE ALLIED PACIFIC SPECIES.

In Flora 58, 123 (1875), Boeckeler described a new species of *Carex* from Fiji as *C. Graeffeana*. His description was based on an undated gathering made by Dr. Graeffe on the island of Ovalau. According to a statement at the end of the description that specimen was then in Herb. Luerissen. The type, or authentic material from the same gathering, was presented to Kew in 1880, when Luerissen's herbarium appears to have been dispersed. The Kew specimen consists of a single culm, in an immature, flowering state, as indicated in Boeckeler's description of the utricles.

Miss L. S. Gibbs, in 1907, and W. Greenwood, in 1920, collected good fruiting material of this sedge in Fiji, and from this a more complete description has been drawn up.

There are two good fruiting specimens of a variety of *C. Graeffeana* from Samoa in the Kew Herbarium. One of these is labelled "Samoa. Rev. S. J. Whitmee. Received May 1876." The other was collected by F. Vaupel at Mataana [Matavanu?] in 1905. It was the excellence of the Vaupel specimen and the fact that it had lain so long unidentified in the Kew Herbarium that led to this investigation. Two further specimens from Samoa, both in a flowering condition, are at Kew, collected by E. Christophersen and E. P. Hume, of the Bernice P. Bishop Museum, Honolulu, in July 1931. Before being presented to Kew these two sheets had been determined by G. Kükenthal as *C. Graeffeana*. Compared with the Fijian material, that from Samoa differs in having broader leaves, larger spikes and utricles, sometimes a larger number of spikes to each culm, and more strongly nerved utricles.

A similar plant was collected by A. Loher in Benguet, Philippine Islands, between 1889 and 1898 (the specimen bears no date, but Loher resided in the Philippines for some years from 1889). This gathering, in ripe fruit, is at Kew, as well as eight others, some of which are also in fruit but others are immature. C. B. Clarke made short descriptive notes on the Loher sheet in 1898, including two suggested epithets. These were heavily scored out at some later date, and Clarke identified the plant in 1902 as *C. Graeffeana* Boeck.

Kükenthal, in his great monograph of the sedges in Das Pflanzenreich, 1909, gave a description, under the name *C. Graeffeana*,

*Continued from K.B. 1937, 473.

based on Loher's plant from the Philippines. It is not surprising that he rather suspected the Philippines plant to be different from Boeckeler's Fijian *C. Graeffeana*, as the distance between the two groups of islands would indicate. In a note at the foot of his description, after stating that he had not seen Boeckeler's type, he writes :—" Descriptio supra data a planta Loheri n. 699 sumpta non omnino cum diagnosi plantae Graeffei congruit et forsan ad speciem alteram spectat." But he let the matter rest there.

Merrill and Merritt in their "Flora of Mount Pulog" [Luzon] (Philipp. Journ. Sci. **5**, 335: 1910) under *C. Graeffeana* Boeck. state : " In the mossy forest, alt. about 2400 m. Widely distributed on the higher mountains of the Philippines; Fiji." However, in his enumeration of Philippine Plants, **1**, 138 (1923), Merrill says, after citing a number of gatherings from the Philippines, " On the slopes in open spaces, along streams, and in the mossy forest, altitude 1600 to 2200 m. Samoa." He makes a similar statement in vol. **4** : "*Carex Graeffeana* Boeck. is known only in the Philippines and Samoa."

Clarke, in his "Cyperaceae of the Philippines: a list of the species in the Kew Herbarium" (Philipp. Journ. Sci. Bot. **2**, 107: 1907), has these references under the name *C. Graeffeana* : " Luzon, Benguet (699 Loher). Mindanao (1250 Copeland). Samoa."

Kükenthal, "Conspectus Cyperacearum insularum philippinensium: Cyperaceae-Caricoideae" (Philipp. Journ. Sci. Bot. **6**, 62: 1911), gives additional references and ends : " Area: Fidschi Inseln."

A careful examination of the flowering and fruiting material at Kew and the British Museum has shown that the specimens collected in the Philippines and identified by various botanists as *Carex Graeffeana* Boeck. are those of a distinct but closely allied species. The name *C. philippinensis* is proposed for this, and a more complete description has been drawn up than that given by Kükenthal in Das Pflanzenreich under the name *C. Graeffeana*.

"*Carex Graeffeana* Boeck. is recorded from Fiji and the Philippines (Luzon, Negros, Leyte, Mindanao) and Java (Gedeh) between 1600 and 2200 m. alt. I here refer also Clemens 34297 from Borneo (Kinabalu)." This statement is made by van Steenis in his paper : " On the origin of the Malaysian mountain flora, pt. I," in Bull. Jard. Bot. Buitenzorg, sér. 3, **13**, 198 (1934). This Clemens number is in the Kew Herbarium and examination shows it to be distinct from *C. Graeffeana* and *C. philippinensis*, but with them forming a closely interrelated group of the distigmatic *Eucarex*. It is named *C. exploratorium* in honour of Chaplain and Mrs. Clemens who discovered the plant together. I have not seen the plant referred to by van Steenis as occurring in Java.

It is not easy to see why Kükenthal placed *C. Graeffeana*, a species without a beak to the fruit and a native of the Pacific islands, in his section *Fecundae*, the other eleven members of which are all South or Central American, and have shortly beaked

and mostly bidentate utricles. A much closer relationship would appear to be with the section *Acutae*, and probably near the subsection *Praelongae*.

Unless otherwise stated the specimens cited are in the Kew Herbarium.

CLAVIS SPECIERUM.

- A. Squamae utriculis sublongiores ; folia 10 mm. lata ; spicae 14, usque ad 11.5 cm. longae ; utriculi 3 mm. longi, oblongo-elliptici, apice obtusi et erostrati.....*C. exploratorum*
- B. Squamae dimidiis utriculis sublongiores :
 - 1. Folia 4-5 mm. lata ; spicae 9-18, usque ad 6 cm. longae ; utriculi 2.75 mm. longi, obovati, erostrati, marginibus superne scabro-ciliati, apice obtusi.....
C. philippinensis
 - 2. Folia 6-9 mm. lata ; spicae 16-18, usque ad 11 cm. longae, 3.5 mm. latae ; utriculi 1.75 mm. longi, ovato-elliptici, tenuiter nervati, in apicem laevem obtusum attenuati.....*C. Graeffeana*
 - 3. Folia usque ad 12 mm. lata ; spicae 16-27, usque ad 8.5 cm. longae, 5 mm. latae ; utriculi 2.5 mm. longi, elliptici, valde nervati, apice laeves et obtusi.....
C. Graeffeana var. *samoënsis*

Carex exploratorum *Nelmes*, sp. nov.

Culmi circiter 70 cm. alti, validi, triquetri, angulis praecipue superne scabridis. *Folia* culmos longe superantia, 10 mm. lata, coriacea, plana vel marginibus aliquid recurvata, scabrida. *Spicae* 14, 12 androgynaeceae* et 2 supremae minimae et mere masculae, parte mascula $\frac{1}{3}$ spicae aequante, infima basi spicis compluribus masculis minimis praedita, aliquid composita, usque ad 11.5 cm. longae (pedunculo excluso) et 6 mm. latae, cylindricae, densiflorae, subapproximatae, superiores pedunculatae, inferiores longipedunculatae, pedunculis usque ad 12 cm. longis, angulis 2-3 scabris. *Bractae* evaginantes, inferiores foliaceae, inflorescentiam longe superantes, superiores breves et setaceae, marginibus scabrae, supremae squamiformes. *Squamae femineae* oblongo-ellipticae, fusco-brunneae, superiores e vitta mediana pallide trinervi in mucronem durum scabrum, inferiores in aristam planiusculam durum scabram excurrentes, utriculis sublongiores. *Utriculi* leviter oblique patentes, 3 mm. longi, 1.1 mm. lati, plurinerves, oblongo-elliptici, biconvexi (vel saepe abortivi et compresso-biconvexi), glabri vel furfuracei, straminei, basi rubidobrunnei et obtusi, in apicem obtusissimum leviter emarginatum erostratum desinentes. *Nux* obovata, minutissime papillosa, in

* The term *androgynaecea* is used here to denote a spike in which the upper flowers are male and the lower ones female (see footnote in K.B. 1937, 355).

utriculo arcte (apice excepto) inclusa, biconvexa, apice minute obtuse mucronulata. *Stigmata* 2.

BRITISH NORTH BORNEO. Mt. Kinabalu; Penataran river, 1200 m., July 28, 1933, J. & M. S. Clemens 34297 (fruiting material).

Carex philippinensis *Nelmes*, sp. nov.

Culmi usque ad 90 cm. alti, validi, angulis triquetris scabridis. *Folia* inflorescentiam longe superantia, 4-5 mm. lata, coriacea, plana vel marginibus scabridis aliquid revoluta. *Spicae* 9-18, androgynoecliae, parte mascula $\frac{1}{3}$ spicae aequante, usque ad 6 cm. longae (pedunculo excluso) et 6 mm. latae, erectae, cylindricae, densiflorae, superiores subapproximatae, breviter pedunculatae, inferiores magis distantes et longius pedunculatae, pedunculi usque ad 2.5 cm. longi, tenaci-flexiles, angulis scabris. *Bractaeae* evaginantes, inferiores foliaceae, inflorescentiam longe superantes, superiores breves et setaceae, marginibus scabrae, supremae squamiformes. *Squamae femineae* oblongo-obovatae, fusco-brunneae, e vitta mediana pallide trinervi in aristam planiusculam duram scabro-marginatam excurrentes, dimidiis utriculis sublongiores. *Utriculi* demum divaricati, 2.75 mm. longi, 1.3 mm. lati, 10-12-costati, obovati, biconvexi, glabri, fusi, in basin obtusam subabrupte contracti, marginibus superne scabro-ciliati, in apicem obtusissimum erostratum desinentes. *Nux* elliptica, minutissime papillosa, in utriculo arcte inclusa, biconvexa, brevissime rostrata. *Stigmata* 2.

PHILIPPINE ISLANDS. Luzon: Benguet, without date, *Loher* 699; Benguet, Baguio, March 1907, *Elmer* 8532; Benguet, May 1914, *Merrill* 9652 (Kew. et Mus. Brit.); Benguet, Pauai, April-June 1918, *Santos* in *Herb. Bur. Sci.* 31,742; Benguet, Mt. Simacoco, Oct. 1921, *Ramos & Edaño* in *Herb. Bur. Sci.* 40,342. Mindanao: Davao, Todaya, river bank, 810 m., Oct. 1904, *Copeland* in *Herb. Bur. Govt. Labs.* 1250; Davao, Todaya, Mt. Apo, Aug. 1909, *Elmer* 11,590 (Kew. et Mus. Brit.); Bukidnon, Mahilucot River, June-July 1920, *Ramos & Edaño* in *Herb. Bur. Sci.* 38,642. Negros: Negros Oriental, Dumaguete, Cuernos Mts., April 1908, *Elmer* 9842 (type, fruiting specimen) (Kew. et Mus. Brit.).

Carex Graeffeana *Boeck.* in *Flora*, 58, 123 (1875).

Culmi usque ad 1 m. alti, validi, angulis triquetris scabridis. *Folia* inflorescentiam longe superantia, 6-9 mm. lata, coriacea, plana vel marginibus aliquid recurvata, scabrida. *Spicae* 15-18, androgynoecliae (nonnunquam spicae 1 vel 2 supremae minimae et mere masculae), parte mascula $\frac{1}{3}$ spicae aequante, usque ad 11 cm. longae (pedunculo excluso) et 3.5 mm. latae, cylindricae, densiflorae, graciles, superiores subapproximatae et pedunculatae, inferiores magis distantes et longipedunculatae; pedunculi usque ad 9 cm. longi, graciles, tenaci-flexiles, angulis scabris. *Bractaeae* evaginantes, inferiores foliaceae, inflorescentiam longe superantes, bractaeae superiores breves et setaceae, marginibus scabrae, bractaeae

summae squamiformes. *Squamae femineae* oblongo-ovatae, fusco-brunneae, e vitta mediana pallide trinervi in mucronem durum scabrum ultra apicem truncatum excurrentes, dimidiis utriculis sublongiores. *Utriculi* erecti, 1.75 mm. longi, 1 mm. lati, 10-12-nerves, elliptici, biconvexi, glabri, straminei, basi obtusi, in apicem brevem interdum leviter emarginatum laevem obtusum erostratum rubidum sensim desinentes. *Nux* late elliptica, minutissime papillosa, in utriculo arcte inclusa, compresso-biconvexa, apice minute obtuse mucronulata. *Stigmata* 2.

FIJI ISLANDS. Ovalau: *Graeffe* 1228 (? type, flowering specimen). Viti Levu: Nandarivatu, forest near the summit of Mt. Victoria, 1200 m., Sept. 1907, *Gibbs* 796 (Mus. Brit.); Lautoka, Mt. Evans, in wet places on the mountains, in big clumps, height 2-3 ft., Oct. 3, 1920, *Greenwood* 120.

var. **samoënsis** *Nelmes*, var. nov.

Folia usque ad 12 mm. lata; *spicae* 16-27, usque ad 8.5 cm. longae, 5 mm. latae; *utriculi* 2.5 mm. longi, elliptici, valde 18-20-nerves. *Nux* breviter stipitata, in rostrum breve desinens.

SAMOA ISLANDS. Samoa: without precise locality, received May 1876, *Whitmee* 27; without precise locality, received 1876 and 1877, *Whitmee* (Mus. Brit.). Savaii: Mataana [Matavanu?], 1600 m., Nov. 4, 1905, *Vaupel* 467 (type, fruiting specimen); above Matavanu, swamp in bottom of crater, c. 1500 m., July 29 & 30, 1931, *Christophersen & Hume* 2209, 2228 (ex B. P. Bishop Mus. Herb.).

XVII—ADDITIONS TO THE FLORA OF BORNEO AND OTHER MALAY ISLANDS: VI.* H. N. RIDLEY.

FLACOURTIACEAE.

Casearia Stapfiana *Ridley*, sp. nov., a *C. velutinosa* *Ridley*, cui affinis, ramis foliisque (nervis subtus exceptis) glabris, racemis longioribus, floribus paullo majoribus differt.

Arbor vel *frutex*. *Folia* chartacea, nervis exceptis glabra, ovata, breviter obtuse acuminata, basibus rotundatis vel breviter attenuatis, 19-20 cm. longa, 9 mm.-3 cm. lata, nervis 6-paribus subtus elevatis puberulis intra margines inarquantibus supra depressis, nervis secundariis paucis, nervulis transversis parallelis horizontalibus subtus elevatis; petioli crassi, supra canaliculati, 5 mm. longi. *Flores* in racemos crassos 5 mm. longos 4-angulatos in capitulis axillaribus dense congestos dispositi. *Bractee* ovatae, obtusae, densae, persistentes. *Pedicelli* 2 mm. longi. *Sepala* 5, ovata, obtusa, 2 mm. longa. *Stamina* basi connata, 5 exteriora longiora, 5 interiora breviora, filamentis brevibus, antheris oblongis. *Ovarium* ovoideum, hirtum, ovulis pluribus. *Stylus* crassus, stigmatibus subgloboso.

* Continued from K.B. 1936, 21.

SARAWAK. Kuching, *Haviland* 1669 (type), *Haviland & Hose* 3581.

This closely resembles *C. latifolia* Ridley, of the Malay Peninsula, but the nerves beneath are pubescent and the nervules are parallel and transverse as they are in *C. velutinosa* Ridley, from which it differs in the absence of the velvety pubescence all over the whole plant.

Casearia Moultonii Ridley, sp. nov., a *C. leucolepide* Turcz., cui affinis, foliis oblongo-lanceolatis, nervis pubescentibus, floribus minoribus, squamis interstaminalibus longioribus pilosis differt.

Frutex vel *arbor*, ramis puberulis. *Folia* chartacea, laevia, subtus lucida (sicca brunnea), nervis exceptis glabra, oblongo-lanceolata, acuminata, basibus rotundatis inaequilateralibus, 12–14 cm. longa, 5.5–6 cm. lata, nervis 7-paribus subtus elevatis pilis albescentibus appressis, nervis secundariis paucis anastomosantibus; petioli 1.5 cm. longi, puberuli. *Flores* glabri, virides vel albi, in capitulis axillaribus congesti. *Bractee* ovatae, acutae. *Pedicelli* graciles, 1 mm. longi. *Sepala* 5, linearia, obtusa, 3 mm. longa, pubescentia. *Stamina* 10, basi connata, filamentis superne attenuatis glabris, antheris suborbicularibus, squamis oblongis hirtis alternantibus. *Ovarium* conicum, pubescens. *Stylus* cylindricus, glaber, stigmate discoideo.

SARAWAK. Near Kuching, perianth green, *Haviland* 3096 (type); summit of Mt. Murud, flowers white, *J. C. Moulton* 188.

This is allied to *C. leucolepis* Turcz., but differs in the form of the leaf, and the pubescence. The coronal scales alternating with the stamens are longer and the filaments are shorter.

Homalium caryophyllaceum Benth. in Journ. Proc. Linn. Soc. **4**, 38 (1860). *H. frutescens* Warb. in Engl. u. Prantl, Nat. Pflanzenf. III. **6A**, 36 (1893). *H. Hosei* Merrill in Philipp. Journ. Sci. **11**, 98 (1916).

This abundant and widely spread small tree varies to some extent in the form, size and crenation of the foliage: hence it has received several names. *H. obovale* Miq. (Fl. Ind. Bat. Suppl. 334), of which there is a cotype scrap from Sumatra in Herb. Kew., differs so far as I can see only in being more hairy. The leaves are more distinctly obovate and deeply crenate serrate and very hairy beneath, and the hairs of the panicle are also longer. In all the numerous specimens of the typical plant I have seen there is no more than a slight pubescence underneath the leaf. *H. obovale* was obtained by Teysmann in the Lampongs, Sumatra, in which area I found the ordinary form. I imagine it is merely a local hairy variety.

The typical plant ranges from Siam and Cochinchina to the Malay Peninsula; Bangka, Sungei Liat, *Teysmann*; Sumatra, Batang Mandau, Siak river, *Ridley* 8971; Java, *Zollinger* 958; Sarawak, *Beccari* 705, 1152, 2686, Sarawak river, *Haviland* 184;

British North Borneo, Labuk Bay, Paku Paku river, *Ridley*, Sandakan, *Elmer* 20014, 20136, 20204, 20353, 20355 ; Dutch South East Borneo, Kapuas, *Teysmann*, Banjarmasin, *Motley* 211, 253 ; Celebes, Malili Angkona, *Neth. Ind. For. Service* bb. 19691.

Homalium calciphilum *Ridley*, sp. nov., ab *H. grandifolio* Benth., cui affinis, habitu multo minore, foliis ovatis coriaceis reticulatis, floribus minoribus, staminibus brevioribus, stylis quatuor differt.

Frutex gracilis vel *arbor* parva, floribus exceptis glabra. *Folia* coriacea, ovata, acuminata, basibus rotundatis, 6–11 cm. longa, 4.5 cm. lata, nervis 6 gracilibus utrinque exaltatis et conspicuis, nervulis transversis et reticulationibus conspicuis ; petioli crassi, 4 mm. longi. *Racemi* 5–7 cm. longi, pubescenti-velutini. *Bractae* 2 mm. longae, lanceolatae, acuminatae, caducae. *Pedicelli* velutini, 4 mm. longi. *Sepala* 8, lineari-lanceolata, velutina, 5 mm. longa. *Petala* 8, breviora, lanceolata, velutina, 2 mm. longa. *Stamina* circiter 32, filamentis gracilibus glabris brevioribus. *Ovarium* conicum, hirtum, stylis 4 brevibus.

SARAWAK. Mt. Braang, 450 m. alt., limestone, slender shrub, *Haviland* 92 (type) ; Mt. Buang, limestone, small tree, flowers pale, *Haviland* 2037.

This is allied to *H. grandiflorum* Benth. and seems to be a limestone derivative of that species. It differs in the more ovate coriaceous strongly reticulate leaves and smaller flowers with fewer stamens, 4 to each petal, and is a shrub or small tree, while *H. grandiflorum* is a stout tree 60–80 feet or more tall.

PASSIFLORACEAE.

The following species of *Adenia* are not recorded from Borneo in Merrill's list :—

Adenia acuminata (Bl.) *Koorders*.

SARAWAK. *Beccari* 789 ; Kuching, climber, flowers yellow, *Haviland* 3743.

DUTCH S.E. BORNEO. Banjarmasin, *Motley* 1167.

Adenia borneënsis *H. Hallier*.

DUTCH S.E. BORNEO. Tikung, *Hallier* 891 ; Pembliangan, *Amdjah* 881.

Adenia cordifolia *Engler*.

BRIT. N. BORNEO. Tawao, Elphinstone Province, *Elmer* 21350.

Adenia populifolia (Bl.) *Engler*.

SARAWAK. *Beccari* 2155.

Adenia smilacina *H. Hallier*.

DUTCH S.E. BORNEO. Gunong Lebang, *Hallier* 379.

Adenia Clementis *Merrill*.

I found this British North Borneo plant on Mt. Matang in SARAWAK.

Xanthophyllum glabrescens Ridley, sp. nov., a *X. puberulo* Ridley, cui affinis, inflorescentia ramis foliisque undique glabris, foliis minoribus, ovario glabro, filamentis subglabris differt.

Arbuscula? glabra, ramis gracilibus. *Folia* elliptica, obtuse acuminata, basi cuneata, chartacea, glabra, 7–9 cm. longa, 3.5–5 cm. lata, nervis 5-paribus subtus elevatis inarcuantibus secundariis anastomosantibus; petioli crassi, canaliculati. *Racemi* glabri, subterminales, 9 cm. longi. *Pedicelli* 2 mm. longi. *Sepala* 5, oblonga, obtusa, tenuia, 4 mm. longa. *Petala* alba, elliptica, obtusa, unguiculata, 1 cm. longa, carina latiore brevior appresse sericea. *Stamina* breviora, filamentis linearibus subglabris. *Ovarium* parvum, globosum, glabrum, stipite longo.

SARAWAK. Baram River, *Hose* 38.

Allied closely to *X. puberulum* Ridley, of the Malay Peninsula, but quite glabrous, with smaller leaves; even the ovary is glabrous and the stamens have only a very few hairs.

Xanthophyllum pallidum Ridley, sp. nov., a *X. discolori* Chodat, cui affinis, foliis ovatis acutis laevibus nec subtus discoloribus, petiolis longioribus, floribus minoribus differt.

Frutex? glaber. *Folia* ovata, acuta, basi angustata, marginibus incrassatis, coriacea, glabra, siccitate pallide virescentia, 6–8 cm. longa, 2.5–4.5 cm. lata, nervis 7-paribus subtus elevatis, reticulationibus conspicuis elevatis; petioli 1 cm. longi. *Racemi* axillares et terminales, 4.5 cm. longi, pubescentes. *Flores* albi, remoti. *Pedicelli* 5 mm. longi, pubescentes. *Sepala* pubescentia, oblongo-lanceolata, 2 mm. longa. *Petala* lanceolata, unguiculata, obtusa, 5 mm. longa, carina latiore glabra. *Stamina* non visa. *Ovarium* ovoideum, breviter stipitatum, hirtum. *Stylus* hirtus.

SARAWAK. *Beccari* 729.

Allied to *X. discolor* Chodat, but the leaves are different in shape, petioles much longer and flowers smaller.

Xanthophyllum Hosei Ridley, sp. nov., a *X. cordato* Korth., cui affinis, foliis ellipticis cuspidatis, basibus angustatis, nervis prominentibus in nervum intramarginalem inarcuantibus, floribus minoribus, calyce et rhachide puberulis nec sericeis, bracteis ovatis obtusis differt.

Arbor floribus exceptis glabra. *Folia* subcoriacea, elliptica vel oblonga, cuspidata (cuspidate obtusa 1 cm. longa 2 mm. lata), basibus obtuse angulatis, 15–20 cm. longa, 7–10 cm. lata, nervis subtus elevatis 6-paribus in nervum intramarginalem inarcuantibus, nervis secundariis paucis, nervulis transversis parallelis copiosis; petioli crassi, supra canaliculati, 5 mm. longi. *Panicula* subterminalis, rhachide puberula, racemis 4 vel 7, rhachidibus crassis angulatis puberulis 5–9 cm. longis. *Flores* 7 mm. longi, pedicellis 2 mm. longis puberulis. *Bractee* ovatae, obtusae. *Sepala* oblongo-ovata,

obtusa, puberula, 2 mm. longa. *Petala* lanceolata, obtusa, marginibus minute ciliatis, 6 mm. longa, carina latiore. *Stamina* glabra, filamentis linearibus, antheris ellipticis. *Ovarium* glabrum. *Stylus* hirtus. *Drupe* globosa, rostrata, glabra, 5 mm. longa.

SARAWAK. Niah, *Haviland & Hose* 3157; Baram, *Hose* 311 (type).

Certainly allied to *X. cordatum* Korth., but the elliptic cuspidate leaves with narrowed base and very prominent nerves beneath, as well as the puberulous (not silky) calyces and rachides and the blunt (not acute) bracts, distinguish it readily.

Xanthophyllum molle Ridley, sp. nov., a *X. sulphureo* King, cui affinis, foliis minoribus tenuibus ellipticis basibus rotundatis subtus hirtis nervis paucioribus, racemis brevioribus paucifloris, floribus minoribus, ovariis dense longe hirtis differt.

Arbor, ramis pallide hirtis. *Folia* chartaceo-coriacea, elliptica, acuminata, basibus obtusis, supra glabra, subtus cinnamomea, costa nervisque rufescenti-hirtis, 6–12.2 cm. longa, 3–5 cm. lata, nervis 5–7-paribus; petioli dense rufo-hirti, 5 mm. longi. *Racemi* breves, graciles, pauciflori, axillares, rufo-puberuli, 5 cm. longi; pedicelli 3 mm. longi. *Bracteae* ovatae, acutae. *Sepala* ovato-lanceolata, puberula, 3 mm. longa. *Petala* lineari-spathulata, 1.2 cm. longa, carina spathulata glabra subaequilonga. *Stamina* breviora, glabra. *Ovarium* longe stipitatum, dense hirtum. *Stylus* basi crassus, hirtus, superne attenuatus, glaber, stigmate capitato.

SARAWAK. Niah, *Haviland & Hose* 3158.

Allied to *X. sulphureum* King, but a more slender plant with smaller thinner leaves with fewer nerves; the racemes are short and slender, and the flowers appear to be white.

Xanthophyllum purpureum Ridley, sp. nov., a *X. sulphureo* King, cui affinis, foliis chartaceis ovatis vel lanceolatis cordatis, petiolis brevissimis, floribus purpureis differt.

Arbor, ramis dense hirtis. *Folia* ovata vel lanceolata, acuminata, acuta, basibus rotundatis cordatis, chartacea, supra glabra, 12–16 cm. lata, 3.5–8 cm. lata, costa et nervis 5–6-paribus elevatis subtus dense rufo-hirtis, reticulationibus laxis; petioli hirti, 2–5 mm. longi. *Racemi* axillares et subterminales, 4.5–6 cm. longi, pubescentes. *Flores* purpurei, pedicellis pubescentibus 2 mm. longis. *Sepala* 5, ovato-rotundata, 2 mm. longa, puberula. *Petala* lanceolata, unguiculata, obtusa, 1 cm. longa, carina longiore glabra. *Stamina* non visa. *Ovarium* subsessile, dense hirtum. *Stylus* basi hirtus, 1 cm. longus.

SARAWAK. Foot of Mt. Murud, flowers purple, *J. C. Moulton* 174.

Allied to *X. sulphureum* King, but the leaves are thinner and of different shape, red hairy beneath, with very short petioles, and the flowers are purple.

Securidaca corymbosa Turcz.

SARAWAK. *Beccari* 807; Busau, *Haviland* 499; Pengkulu Ampat, *Haviland* 749; Rejang, Sibul, *Haviland* 2824.

GUTTIFERAE.

Cratoxylon celebicum Bl. [*C. floribundum* (Turcz.) F.-Vill.].

SARAWAK. Path to Tegora, *Haviland* 510.

Cratoxylon cochinchinense (Lour.) Bl. [*C. formosum* (Jack) Dyer] var. **calcareum** Ridley, var. nov.

Frutex. *Folia* adulta elliptica, obtusa, coriacea, subtus glauca, nervis inconspicuis, 4 cm. longa, 2 cm. lata. *Capsula* angusta, acuminata, 1 cm. longa.

SARAWAK. Mt. Start, 450 m. alt., limestone, *Haviland* 1463: "Shrub, leaves glaucous beneath. Petals pink."

Apparently this is a very reduced form of this widely distributed tree, due to its habitat on limestone mountains.

Garcinia vidua Ridley, sp. nov., a *G. opaca* King, cui affinis, differt stigmatibus cerebriformi-rugosa, staminodiis in anulum ad basin ovarii connatis.

Arbor parva, ramis crassiusculis subangulatis canaliculatis. *Folia* rigida, coriacea, elliptico-ovata, cuspidata, 7–10 cm. longa, 3.5–5 cm. lata, cuspidate brevi obtusa, costa supra canaliculata subtus elevata, nervis copiosis parallelis supra inconspicuis subtus obscuris; petioli crassi, 5 mm.–1 cm. longi. *Flores masculi* in axillis congesti, subsessiles. *Bractee* persistentes, ovatae, coriaceae. *Sepala* 4, ovata, coriacea, 2 mm. longa. *Petala* 4, oblongo-ovata, 5 mm. longa. *Androeceum* globosum, sessile, antheris sessilibus oblongis longitudinaliter dehiscentibus. *Flores feminei* in axillis singuli, pedicellis 3 mm. longis. *Sepala* 4, breviter, ovata. *Petala* 4, oblonga, coriacea, 5 mm. longa. *Ovarium* globosum, 4-loculare, stigmatibus cerebriformi-rugosa. *Staminodia* 16, in anulum brevem connata, antheris sterilibus planis. *Bacca* elliptica, 4 cm. longa, stigmatibus cerebriformi coronata.

SARAWAK. *Beccari* 1165 (fruit). Kuching, *Haviland* 2222 (♀ and fruit) (type), 2223 (♂).

Garcinia calophyllifolia Ridley, sp. nov., a *G. picrorrhiza* Pierre, cui affinis, foliis coriaceis oblanceolatis breviter cuspidatis, nervis plurimis tenuibus parallelis differt.

Arbor, ramis superne angulatis. *Folia* elliptico-lanceolata, breviter obtuse cuspidata, basi attenuata, coriacea, 8–9 cm. longa, 3 cm. lata, costa in utraque pagina elevata crassiuscula, nervis tenuibus copiosis parallelis; petioli supra canaliculati, 5 mm. longi. *Cymae* axillares, 3–4-florae. *Pedunculus* quadrangularis, 2 mm. longus, ramis brevibus quadrangularis. *Bractee* minutae, ovatae, obtusae, persistentes. *Flores masculi*: *Pedicelli* 5 mm. longi. *Sepala* externa breviter, rotundata, interna majora, coriacea, rotundata, 2 mm. longa.

Petala tenuia, alba, rotundato-oblonga, 3 mm. longa. *Stamina* in fasciculis 4, antheris rotundatis bilocularibus in margine summo superne fissis. *Pistillodium* globosum, stigmatе latiore integro sessili pulvinato carnosо. *Flores feminei* et *fructus* non visi.

SARAWAK. Near Kuching, *Haviland* 2341.

Garcinia caudiculata Ridley, sp. nov., a *G. dryobalanoide* Pierre, cui affinis, foliis tenuibus, nervis conspicuis, sepalis majoribus, ovario globoso, fasciculis staminum oblongis basi connatis, antheris in facie interna pluribus, loculis globosis differt.

Arbor parva, 3-metralis. *Folia* elliptica vel lanceolata, cuspidata, cuspidе lineari-obtusa 1·5 cm. longa 1 mm. lata, basi cuneata, chartacea, 9–15 cm. longa, 3–5 cm. lata, nervis plurimis parallelis conspicuis, intramarginali tenui; petioli 5 mm. longi. *Panicula* gracilis, axillaris, pauciflora, 2–2·5 cm. longa. *Bracteae* ovatae, acutae, minutae. *Pedicelli* 1 cm. longi. *Alabastra* globosa. *Sepala* 4, majora, rotundato-ovata, 2 mm. longa. *Petala* 4, oblongo-ovata, apice rotundata, flavo-viridia. *Flores masculi*: *Stamina* in fasciculos 4 oblongos latos complanatos truncatos basi connatis, antheris circiter 10 in facie interna, loculis globosis. *Pistillodium* globosum, stigmatе magno sessili discoideo-pulvinato laevi. *Flores feminei* similes, staminodiis nullis, ovario majore. *Bacca* fusiformis, elliptica, ad basin et apicem attenuata, 3 cm. longa, 1·5 cm. crassa, stigmatе orbiculari 2 mm. lato, in pedicello 2 cm. longo.

SARAWAK. Kuching, small tree 10 feet tall, flowers yellowish green, *Haviland* c.e.b.a., 491 (=19) (type), 963, 1012, 1696; *Haviland & Hose* " = 1696Z," 3164, 3347K.

BRIT. N. BORNEO. Mount Kalawat, *Clemens* 11141; Labuan, *Motley* 206.

This small tree much resembles *G. stigmacanthe* Pierre in its leaves and female flowers, but that plant (only known from very poor female specimens) has no intramarginal nerve in the leaves, and the stigma is distinctly papillose. The oblong truncate stamen-fascicles, connate at the base, with few anthers on the inner face chiefly at the upper part, and the fusiform fruit, are peculiar.

Garcinia lanceola Ridley, sp. nov., a *G. merguensi* Wight, cui affinis, foliis elliptico-lanceolatis coriaceis, floribus minoribus, fasciculis staminum gracilioribus, pistillodiis cylindricis, stigmatibus discoideis differt.

Arbor parva, ramulis subangulatis. *Folia* elliptico-lanceolata vel lanceolata, acuminata, obtusa, basi angustata, coriacea, 5–10 cm. longa, 1·5–4·5 cm. lata, nervis copiosis parallelis tenuibus inconspicuis, costa subtus elevata; petioli crassiusculi, 5 mm.–1 cm. longi. *Panicula* axillaris, 5–6-flora, 1·7 cm. longa, pedunculis ramisque crassis angulatis. *Bracteae* ovatae, acutae, minutae. *Pedicelli* 4–7 mm. longi. *Sepala* 4, brevica, ovato-rotundata, 2 mm. longa. *Petala* 4, ovata, apice rotundata, basi angustata, extra

flava, intus alba. *Flores masculi* : *Stamina* in fasciculis 4, petalis breviora, stipitibus linearibus carnosius, antheris circiter 30, loculis globosis apice fuis. *Pistillodium* cylindricum, stigmatate discoideo majusculo. *Flores feminei* et *fructus* non visi.

SARAWAK : Kuching, *Haviland* 2114 (type), 2115 : " Small tree. Calyx yellow without, white within."

This is allied to *G. merguensis* Wight, of the Malay Peninsula, but the leaves are thicker and more fleshy, lanceolate acuminate. The flowers are rather smaller, and the stipites of the fascicles of the stamens taller and more slender with the anthers at the tips only. The pistillode is as large as the stipites. I suppose Haviland's note of the colouring of the flower refers to the corolla rather than the small calyx.

***Garcinia memecyloides* Ridley**, sp. nov., a *G. sarawhensi* Pierre, cui affinis, foliis lanceolatis angustis, floribus minoribus racemosis, pedicellis brevibus, staminodiis latis differt.

Frutex ? ramis gracilibus. *Folia* lanceolata, longe acuminata, obtusa, basi cuneata, sicca pallide virescentia, chartaceo-coriacea, 4.5-6 cm. longa, 1-1.5 cm. lata, nervis 7-paribus ferme omnino obscuris ; petioli 4 mm. longi. *Flores masculi* non visi. *Flores feminei* pauci, minuti, in racemis brevibus axillaribus 2 mm. longis. *Pedunculi* crassiusculi, 1 mm. longi. *Bractee* ovatae, acutae. *Sepala* 4, rotundata, 1 mm. longa. *Petala* tenuiora, rotundata, subaequilonga. *Ovarium* oblongum, stigmatate late pulviniformi. *Staminodia* in fasciculis 4, ovario breviora, oblonga, lata, marginibus lobatis.

SARAWAK. Mt. Koum, limestone, *Haviland* 2216/1724.

The narrow, lanceolate, rather thin, almost nerveless leaves and minute axillary racemes of very few minute flowers distinguish this plant from all others in the genus. I can see no anthers on the staminodes but the only flowers are very young.

***Garcinia umbellulata* Ridley**, sp. nov., a *G. sarawhensi* Pierre, cui affinis, foliis obovatis, pedicellis longioribus gracilibus, bacca multo majore differt.

Arbor parva. *Folia* obovata, basi attenuata, cuspidata, cuspidate lineari obtusa 5 mm. longa 2 mm. lata, coriacea, 6 cm. longa, 5.5 cm. lata, costa in utraque pagina elevata, nervis plurimis parallelis inconspicuis. *Flores* in axillis umbellati, pedunculo 1 cm. longo. *Pedicelli* 1 cm. longi. *Sepala* 4, ovata, acuta, 3 mm. longa. *Petala* 4, rotundata. *Stamina* (in masculis) in fasciculis 4, stipitibus linearibus, antheris pluribus in marginibus, loculis divisus apice fissis. *Pistillodium* subcylindricum, stigmatate disciformi. *Ovarium* (in femineis) obconicum, 2 mm. longum. *Stigma* planum, in medio transversim profunde fissum. *Bacca* globosa, bilocularis, 2 cm. longa, in pedicello crasso 1 cm. longo.

SARAWAK. Near Kuching, small tree, *Haviland* 2220 (♂), 2221 (♀, type).

Garcinia minimiflora Ridley, sp. nov., a *G. sarawhensi* Pierre, cui affinis, foliis minoribus, nervis copiosis approximatis, floribus minutis, pedicellis longioribus gracilibus differt.

Frutex. *Folia* elliptica, cuspidata, basi cuneata, cuspidate lineari obtusa 7 mm. longa ferme 2 mm. lata, coriacea, 3.5–5 cm. longa, 1.5–2 cm. lata, nervis copiosis parallelis inconspicuis; petioli 2–5 mm. longi. *Flores masculi* non visi. *Flores feminei* virescenti-flavi, minuti, in umbellis axillaribus, pedunculo crassiusculo 3 mm. longo. *Pedicelli* 5 mm. longi, graciles. *Sepala* 4, brevia, rotundata. *Petala* 4, rotundata, 1 mm. longa. *Staminodia* fasciculata, oblonga, antherarum loculis globosis.

SARAWAK. *Beccari* 3612; path to Matang, *Haviland* c.l.l.c. (type): "Shrub; flowers small, greenish yellow."

This is certainly allied to *G. sarawhensis* Pierre in its umbellate flowers on long stalks on a short axillary peduncle, but the flowers are much smaller; indeed, I think the most minute in the genus.

Garcinia Havilandii Stapf.

The male plant of this species was described by Stapf (Trans. Linn. Soc. Bot. 4, 32) from a specimen collected by Haviland at Kiau on Mt. Kinabalu. Haviland also, however, collected what is evidently the female tree at Rejang Belaga in SARAWAK (no. 211). This specimen differs in the leaves possessing slender cusps 2.2 cm. long and 1 mm. wide. The female flowers resemble those of the male but are flatter at the top when in bud. The ovary has a round flat papillose top with minute 6-lobed stigma and it is surrounded at the base with a low androecial annulus with very numerous lobes, the abortive anthers.

Calophyllum pustulatum Ridley, sp. nov., a *C. venusto* King, cui affinis, foliis tenuibus multo longioribus acuminatis cuspidatis, panicula laxa, petalis tenuioribus, filamentis capillaribus, antheris globosis differt.

Arbor, ramis pustulatis. *Folia* elliptico-lanceolata, acuminato-cuspidata, cuspidate acuta 1 cm. longa, basi cuneata, coriacea, 8–13 cm. longa, 3–5 cm. lata, nervis pluribus tenuibus subtus elevatis; petioli crassi, rugosi, 4 mm. longi. *Panicula* terminalis, multiflora, laxa, 6–7 cm. longa, 5–6 cm. lata. *Flores* albi, 2–3 in apicibus ramulorum pustulorum congesti. *Pedicelli* 2 mm. longi. *Sepala* 4, rotundata, 4 mm. longa. *Petala* obovata, apice rotundata, deflexa, 5 mm. longa. *Stamina* copiosa, 5 mm. longa, filamentis capillaribus, antheris subglobosis. *Stylus* gracilis, longior.

SARAWAK. Near Kuching, tree, petals white, *Haviland* 2117.

Calophyllum elegans Ridley, sp. nov., a *C. venusto* King, cui affinis, floribus minoribus, paniculis laxis, sepalis petalisque multo minoribus, pedicellis longioribus tenuibus differt.

Arbor magna, glabra. *Perulae* breves, triangulares. *Folia* obovata vel elliptica, obtusa, basi attenuata, decurrentia, 4–6.5 cm.

longa, 2.5–3.5 cm. lata, rigide coriacea, costa utrinque elevata, nervis copiosis subhorizontalibus; petioli 1 cm. longi. *Paniculae* subterminales et axillares, laxae, plures, 8–10-florae, 4–5 cm. longae. *Flores* albi, in paribus oppositis dissitis. *Pedicelli* graciles, 1.4 cm. longi. *Sepala* 4, alba, 2 exteriora rotundata, 2 tenuia, oblonga, obtusa, 6 mm. longa. *Petala* 3, oblongo-subspathulata, obtusa, 9 mm. longa. *Stamina* breviora, antheris brevibus ellipticis.

SARAWAK. Near Kuching, *Haviland* 968: "Large tree. Sepals white, petaloid."

This beautiful tree is clearly allied to *C. venustum* King, a small tree of the mountains of the Malay Peninsula, but the panicle is more lax and slender, the flowers much smaller, and the sepals longer and narrower and thin textured.

Calophyllum cuspidatum Ridley, sp. nov., a *C. venusto* King, cui affinis, foliis tenuibus lanceolatis longe cuspidatis, floribus paucioribus, petalis oblongis differt.

Arbor, ramulis gracilibus. *Perulae* triangulatae, rufo-furfuraceae. *Folia* elliptico-lanceolata, marginibus sinuatis, cuspidata, cuspidate obtusa 7 mm. longa, basi attenuata, chartacea, 4–6 cm. longa, 2–2.3 cm. lata, nervis copiosis subascendentibus; petioli 5 mm. longi. *Paniculae* axillares et subterminales, pauciflorae, 4 cm. longae, ramis paucis gracilibus 2 cm. longis. *Pedicelli* 7 mm. longi. *Sepala* 2 exteriora ovata, obtusa, 3 mm. longa, interiora oblonga, obtusa, 5 mm. longa. *Petala* tenuiora, oblonga, obtusa, 7 mm. longa. *Stamina* 6 mm. longa, antheris ellipticis.

SARAWAK. Baram, *Hose* 37.

Calophyllum Benjamina Ridley, sp. nov., a *C. venusto* King, cui affinis, foliis lanceolatis acuminatis, nervis ascendentibus nec subhorizontalibus, sepalis 2 rotundato-ovatis 2 latioribus et longioribus differt.

Arbor glabra, ramulis vix angulatis. *Folia* remota, lanceolata, saepe longe obtuse acuminata, basi longe attenuata, 6–7 cm. longa, 2–3 cm. lata, costa tenui elevata, nervis copiosis ascendentibus tenuissimis; petioli 1 cm. longi. *Panicula* subterminalis, laxa, patens, 7–10 cm. longa. *Pedicelli* graciles, 1–2 cm. longi. *Flores* in paribus remotis oppositi, circiter 7. *Sepala* 2 exteriora ovata, rotundata, 2 interiora majora, oblonga, obtusa, 5 mm. longa. *Petala* oblonga, obtusa, 7 mm. longa. *Stamina* breviora, 4 mm. longa, antheris ellipticis 1 mm. longis.

BRUNEI. Limbang, *Haviland* 505.

This is clearly allied to *C. venustum* King, but is distinct in the long-petioled long acuminate leaves with ascending nerves rising towards the top at an acute angle, suggesting a resemblance to those of *Ficus Benjamina* L. The panicles are lax with few flowers, about seven, which however are large.

Calophyllum fragrans Ridley, sp. nov., a *C. retuso* Wall., cui affinis, pedicellis multo longioribus, paniculis majoribus glabris, floribus majoribus differt.

Arbor. *Folia* obovata, apice rotundata, basi angustata, rigide coriacea, 5–6 cm. longa, 3.5–4 cm. lata, nervis subascendentibus; petioli supra canaliculati, 5 mm.–1 cm. longi. *Paniculae* ex axillis summis congestae, multiflorae, 5 cm. longae. *Pedicelli* graciles, glabri, 1.5 cm. longi. *Sepala* exteriora ovata, brevia, interiora oblonga, apicibus rotundatis ciliatis, 5 mm. longa. *Petala* nulla. *Stamina* breviora, 4 mm. longa, antheris oblongis truncatis. *Ovarium* conicum, glabrum.

SARAWAK. 2 miles from Kuching, *Haviland* 1812; *Haviland & Hose* 3355K (type): "Flowers sweet-scented. Sepals and petals white, stamens yellow."

This, as Stapf notes on the sheet of specimens, is very near *C. retusum* Wall., of Singapore, but the leaves are rather bigger and the pedicels very much longer, those of *C. retusum* being very short. The flowers are larger and the panicles wider and more spreading. There is almost a complete absence of the scurfiness so characteristic of *C. retusum*, but I can see in the panicle a faint trace of short hairs.

Calophyllum glaucescens Ridley, sp. nov., a *C. saigonensi* Pierre foliis oblongis crassioribus subtus glaucescentibus, nervis subtus ferme omnino obscuris differt.

Arbor parva, glabra, ramis cortice albescente tectis. *Folia* elliptica, subacuta, basi cuneata, rigide coriacea, supra laevia (sicca brunnea), subtus glaucescentia, 6–11 cm. longa, 4.5–6 cm. lata, costa crassiuscula elevata canaliculata, nervis supra obscuris subtus inconspicuis; petioli crassiusculi, 1 cm. longi. *Racemi* 3–5-flori, 2 cm. longi, ex axillis inferioribus. *Bractae* ovatae, 3 mm. longae. *Pedicelli* 1.5 cm. longi. *Alabastra* oblonga. *Sepala* 3, oblongo-ovata, apicibus rotundatis, tenuia, 5 mm. longa. *Petala* 2, subaequilonga, crassiora. *Stamina* petalis breviora, antheris lineari-oblongis. *Ovarium* ovoideo-oblongum. *Stylus* crassiusculus, stigmatibus rotundato obscure lobato.

SARAWAK. Near Kuching, a small tree, flowers white, *Haviland* 2058.

Calophyllum Hosei Ridley, sp. nov., a *C. inophylloidi* King, cui affinis, foliis majoribus, floribus glabris, petalis nullis differt.

Arbor glabra. *Perulae* breves, triangulares, acutae. *Folia* obovata vel oblanceolata, apice rotundata, emarginata, basi attenuata, rigide coriacea, 4–6 cm. longa, 3–3.5 cm. lata, nervis copiosis tenuibus; petioli supra canaliculati, 1 cm. longi. *Racemi* glabri, subterminales, laxi, pauciflori, 8–10 cm. longi. *Pedicelli* validi, 2 cm. longi. *Sepala* 4, exteriora ovato-rotundata, coriacea, 5 mm. longa, interiora oblongo-rotundata, marginibus ciliatis, 1 cm. longa, 4 mm. lata. *Petala* nulla. *Stamina* brevia, 5 mm.

longa, antheris brevibus oblongis truncatis 2 mm. longis. *Ovarium* subglobosum.

SARAWAK. Baram, *Hose* 146.

Calophyllum globuliferum Ridley, sp. nov., a *C. oblongifolium* Anders., cui affinis, pedunculis gracilibus, drupis parvis globosis, a *C. pisifero* Planch. pedunculis elongatis et ramulis glabris differt.

Arbor parva, glabra. *Perulae* breves, triangulatae, furfuraceae. *Ramuli* vix angulati. *Folia* obovata vel oblanceolata, obtusa, basi angustata, acuta, marginibus incrassatis, coriacea, 3.5–4.5 cm. longa, 2.5 cm. lata, costa subtus elevata, nervis copiosis paullo ascendentibus; petioli 5 mm.–1 cm. longi. *Racemi* axillares, oppositi. *Pedunculi* graciles, 5 mm. longi. *Flores* pauci, albi, 1 cm. lati. *Pedicelli* graciles, 5 mm. longi. *Sepala* 4, oblonga, obtusa. *Petala* 4, tenuiora. *Stamina* brevia, 3 mm. longa, antheris ellipticis. *Drupae* pisiformes, 6 mm. longae.

DUTCH S. E. BORNEO. Banjarmasin, small tree, flowers white, *Motley* 618 (type); summit of Bukit Besar, 1000 ft. alt., *Motley* 304.

In habit this plant resembles *C. oblongifolium* Anders., but the flowers are borne on long, slender peduncles and pedicels, and have two petals. The fruits are small and globular like those of *C. pisiferum* Planch., but that is a shrub with hairy shoots.

In the mountain form (*Motley* 304) the leaves are larger, 7 cm. long, 5.5 cm. wide, and more oblanceolate.

Calophyllum palustre Ridley, sp. nov., a *C. borneënsi* Vesque, cui affinis, foliis floribusque multo majoribus differt.

Arbor magna, ramulis angulatis. *Perulae* lanceolatae, acuminatae, furfuraceae, 1 cm. longae. *Folia* lanceolato-oblonga, acuta, basi angustata, 13–15 cm. longa, 4.5–7.5 cm. lata, costa supra ad basin canaliculata, subtus crasse elevata, nervis copiosis parallelis; petioli supra canaliculati, 3 cm. longi. *Panicula* axillaris, valida, 19 cm. longa, ramis paucis remotis crassis 5–7 cm. longis. *Pedicelli* crassi, furfuracei, 5 mm.–1.5 cm. longi. *Sepala* 4, oblongo-ovata, furfuracea, apice obtusa vel rotundata, 9 mm. longa. *Petala* oblonga, rotundata, 1.3 cm. longa. *Stamina* 9 mm. longa, antheris lineari-oblongis. *Stylus* longior, crassiusculus, glaber.

DUTCH S. E. BORNEO. Banjarmasin, *Motley* 1129: "Deep marshes, common. A large tree. The wood is reddish-white, coarse grained but very strong, making excellent flooring planks, for which purpose as well as for hollowing into canoes it is largely used. The bark is exceedingly rough and thick, and when wounded yields a quantity of yellowish gum resin, having a peculiar smell like that of mice; it is used by natives as an application for itch and other skin diseases."

Calophyllum frutescens Ridley, sp. nov., a *C. borneënsi* Vesque, cui affinis, foliis majoribus elliptico-oblongis, floribus glabris majoribus differt.

Frutex arborescens, ramulis velutinis. *Perulae* lanceolatae, acuminatae, velutinae, 1 cm. longae. *Folia* elliptico-oblonga, apice et basi obtusa, rigide coriacea, 8.5–9 cm. longa, 3.5–4.3 cm. lata, nervis copiosis prominulis subhorizontalibus; petioli validi, 1.5 cm. longi. *Paniculae* breves, 2–3 cm. longae, pauciflorae. *Pedicelli* 2 cm. longi. *Sepala* exteriora ovata, obtusa, 5 mm. longa, 5 mm. lata, interiora oblonga, 1.2 cm. longa, 4 mm. lata. *Petala* 2, sub-similia. *Stamina* 5 cm. longa, antheris oblongis. *Ovarium* ovoideum. *Stylus* 6 mm. longus, stigmatibus obscure trilobis. *Drupa* viridis, sphaerica, ferme 2 cm. diametro.

DUTCH S. E. BORNEO. Banjarmasin, *Motley* 54: "Tree-like shrub. Flowers white, sweet-scented. Fruit green, sphaeroid, $\frac{3}{4}$ inch in diameter."

This is allied to *C. borneense* Vesque, but the flowers are much larger and not furfuraceous and the leaves large and oblong.

Calophyllum Motleyi Ridley, sp. nov., a *C. pisifero* Planch., cui affinis, habitu arborescente, ramulis furfuraceis, foliis lanceolatis acuminatis differt.

Arbor mediocris, glabra, ramulis quadrangulatis furfuraceis. *Folia* lanceolata, apice et basi aequaliter acuminata, obtusa, coriacea, sicca supra atra subtus brunnea, 4–5 cm. longa, 1.2 cm. lata, nervis copiosis tenuibus subhorizontalibus; petioli 5 mm. longi. *Paniculae* ex axillis inferioribus, furfuraceae, densae, 1 cm. longae. *Pedicelli* 2 mm. longi. *Flores* parvi, 4 mm. diametro. *Sepala* exteriora oblonga, furfuracea, interiora oblonga, truncata, paullo longiora. *Petala* nulla. *Stamina* circiter 30, sepalis aequilonga, antheris ellipticis rotundatis.

DUTCH S. E. BORNEO. Banjarmasin, *Motley* 865: "A second rate tree, bark very thick, yielding plentifully a bright yellow gum soluble in water. Wood red, beautifully waved but rather coarse."

This is allied to *C. pisiferum* Planch., but that is a hairy, not furfuraceous shrub, and the leaves are round-topped, the outer sepals orbicular, the inner ones subspathulate.

Kayea oblongifolia Ridley, sp. nov., a *K. grandi* King, cui affinis, petiolis brevibus et floribus multo minoribus differt.

Arbor glabra, ramulis subangulatis. *Folia* oblonga, acuta, basi rotundata, cordata, coriacea, 15–25 cm. longa, 7–9 cm. lata, nervis transversis 20-paribus, secundariis subaequalibus, omnibus subtus elevatis gracilibus, reticulationibus parvis elevatis; petioli rugosi, crassi, 7 mm. longi. *Paniculae* terminales, 6 cm. longae, pedunculis ramisque angulatis. *Pedicelli* 5 mm. longi. *Alabastra* globosa. *Sepala* 5, ovato-rotundata, coriacea, marginibus tenuioribus, 5 mm. longa. *Petala* 5, oblongo-oblancheolata, obtusa, unguiculata. *Stamina* vix longiora. *Stylus* crassiusculus.

SARAWAK. Near Kuching, *Haviland* 1833.

BRIT. N. BORNEO. Sandakan (type) and East Coast, *Creagh*. Sandakan, level land at Kabili, alt. 3 m.s.m., 8 May 1932, *Puasa* in

Herb. For. Dept. 1865: "Tree 15 ft. [4.5 m.] high, 3 in. [7.5 cm.] diam., flowering like *bitaog*, white, in a group."

Allied to *K. grandis* King, but the petioles are shorter and the flowers are very much smaller, also the leaves are rounded and cordate at the base.

Kayea paniculata *Merrill*.

BRIT. N. BORNEO. Labuan, *Motley* 96: "A small tree, bark smooth, wood reddish, moderately hard."

I cannot distinguish this specimen from the Philippine plant.

Kayea calophylloides *Ridley*, sp. nov., a *K. parviflora* *Ridley*, cui affinis, foliis multo majoribus late lanceolatis cuspidatis, floribus pluribus differt.

Arbor glabra. *Folia* lanceolata, cuspidata, cuspidate lineari-obtusa 1 cm. longa 2 mm. lata, basi rotundata vel minute acuta, 9–11 cm. longa, 3.5–4.5 cm. lata, costa utrinque elevata, nervis parallelis copiosissimis; petioli breves, crassi, 7 mm. longi. *Flores* pauci et parvi, in racemis pluribus terminalibus 2.5–10 cm. longis. *Pedicelli* 4 cm. longi. *Alabastra* globosa. *Sepala* 4, ovata, coriacea, 2 mm. longa, interiora tenuiora. *Petala* alba, oblanceolata, obtusa, unguiculata, 3 mm. longa. *Stamina* copiosa, paullo longiora. *Fructus* subsessiles, globosi, sepalis cerebriformiter rugosis 1 cm. longis.

SARAWAK. Near Kuching, *Haviland* 2342; *Haviland & Hose* 3201 (type). Tegara, *Haviland & Hose* 3678. Baram, *Haviland & Hose* 3178. Marudi, *Hose* 258. Matang, in fruit, *Ridley*.

This has the small flowers of *K. parviflora* *Ridley*, of Perak, but the large, broadly lanceolate, closely transversely ribbed leaves, like those of a *Calophyllum*, make it very distinct. In fruit the sepals are very curiously wrinkled in a meandriiform manner.

XVIII—NEW OR LITTLE-KNOWN PLANTS FROM SOUTHERN INDIA: IX.*

Portulaca Wightiana *Wall.* [Portulacaceae].

Chingleput District, Tambaram, 200 ft., *E. Barnes* 1510.

Professor Barnes supplies the following notes: "It grows in barren sandy patches in scrub jungle. It has 4 petals only, 5–8 stamens and a 4–5-lobed stigma (generally 8 stamens and 5 stigma-lobes). The root is tuberous. The flowers open only for about 1 hour (1.30–2.30 p.m.) in full exposure to the sun."

Osbeckia truncata *D. Don ex Wight et Arn.* [Melastomataceae].

Travancore High Range, Kalaar, in evergreen forests, 4750 ft. fls. and frt. May, *E. Barnes* 1519, 1570, 1579.

In the Fl. Brit. Ind. 2, 514, the calyx-tube as well as its teeth are said to bear "stalked stellate hairs." In all the specimens examined the hairs are more often sessile than stalked and the stellate hairs

* Continued from K.B. 1938, 37.

are intermixed with simple ones, usually from tubercular bases. The flowers in Prof. Barnes' specimens are either 4- or 5-merous.

Osbeckia reticulata Bedd. [Melastomataceae].

This species has been recorded from the Anaimalai and Palni Hills and has now been discovered in Travancore.

Travancore High Range, Kandale Valley from Palaar to Chunduvairai, along streams and edges of evergreen forest, 5500 ft. fls. May *E. Barnes* 1528, 1571, 1572.

In the above mentioned specimens the appendages of the calyx are long-stalked, not short-stalked as in Beddome's collection and as described. The flowers are up to 3.6 inches across.

Medinilla malabarica Bedd. [Melastomataceae].

The published descriptions of this plant appear to have been based on scanty material collected by Beddome. In the Kew Herbarium there are only two sheets, each with a few short twigs with 2 or 3 flowers and detached leaves (2 on one sheet and 6 on the other). The leaves are described as elliptic and narrowed at both ends. Professor Barnes has now furnished better material and notes, from which the following description has been compiled :

Branchlets thick, light chocolate-brown with corky warts. *Leaves* nearly circular, ovate or broadly elliptic, obtuse or retuse, base rounded or slightly narrowed, usually with small auricles, 5.5-9.5 cm. long, 3-5 cm. wide, upper surface uniformly dark-green except the red extreme base, ribs depressed, lower surface pistachio-green, midrib crimson to the apex, lateral ribs crimson nearly to the apex, occasionally another more slender rib is present close to either crimson margin. *Flowers* pendent in 3-flowered cymes in groups of 3 from the naked nodes below the leaves. *Peduncles*, *pedicels* and *calyx* sealing-wax red. *Petals* amber in bud, overlapping clockwise, inequilateral, outer rounded, inner concave with a membranous wing, up to 17 mm. long, becoming flushed with scarlet, but not deep coloured, as the flower expands. *Stamens* in 4 groups of 2 each ; filaments fleshy, somewhat flattened and curved, white. *Style* straight, slightly longer than the stamens, white ; stigma terminal, minute.

Travancore High Range, Anaimudi slopes, 7,500-8,000 ft., on stream banks, fls. May, *E. Barnes* 1589, 1590, 1600 (spirit specimen in Kew Herb.).

The plant is rooted in the soil, the stem runs up the trunks of trees and its leaves and flowers hang down in bunches from the underside of the branches of the supporting tree.

Ophiorrhiza incarnata C. E. C. Fischer, sp. nov. [Rubiaceae].

O. pectinatae Arn. affinis, sed foliis minoribus anguste ellipticis, nervis lateralibus angulo lato ortis procul a margine manifeste arcuato-anastomosantibus, corolla carminea lobis glabris differt.

A *herb* 20-30 cm. tall ; stem rooting below, more or less brown-pubescent at and below the nodes, internodes 4, 4-9 cm. long,

with a vertical line of brown pubescence. *Leaves* narrowly elliptic, acuminate at both ends, base slightly inequilateral, 5.5–9 cm. long, 1.7–2.5 cm. wide, midrib rather broad, primary nerves 8–10 pairs, arising at a wide angle from the midrib, arching forwards to unite with a distinct loop well within the subundulate margins, midrib below and margins above minutely scabrid, when dry dark-green above, pale-green below; petioles 5–10 mm. long, brown-puberulous; stipules early deciduous, broadly ensiform. *Inflorescence* terminal, dense-flowered. *Bracteoles* ovate-lanceolate, subacute, slightly inequilateral, 5.5–6.5 mm. long, 2.2–2.8 mm. wide, midrib distinct, glabrous, pellucid-dotted. *Pedicels* very short. *Calyx* glabrous; tube 5-ribbed, 1.7 mm. long; lobes broadly ensiform, acute, keeled on the back, 1.4 mm. long. *Corolla* 8.5 mm. long, crimson, 5-winged in bud at the apex; tube slender, very slightly widened at the mouth, glabrous except for a broad belt of suberect hairs around the insertion of the stamens within; lobes broadly triangular, acute, 1.3 mm. long. *Stamens* inserted at about the middle of the corolla-tube: filaments slender, 2.4 mm. long; anthers linear-oblong, 2 mm. long, apices exserted. *Disk* of 2 fleshy oblong-quadrate lobes 0.6 mm. long and about twice as broad. *Style* slender; stigmas linear, finely acuminate, reaching to the base of the filaments. *Fruit* not seen.

Nilgiri Wynaad, near Nadgani, in a Pandanus swamp, 3000 ft., fls. June, *E. Barnes* 1559 (type in Kew Herb.), 1558.

Ophiorrhiza caudata *C. E. C. Fischer*, sp. nov. [Rubiaceae].

O. pectinatae Arn. affinis, sed foliis angustioribus plerumque caudatis brevius petiolatis, corolla infundibuliformi differt.

An *undershrub* 38–75 cm. tall; stem erect, woody below, glabrous, internodes 4–7, 3–11 cm. long. *Leaves* elliptic-lanceolate, acuminate or more usually caudate, base acuminate, 7–12 cm. long, 1.6–3.5 cm. wide, glabrous, sometimes minutely scaberulous along the margins above, primary nerves 8–9 pairs, uniting very near the margin, when dry dark olivaceous-green above, pale brownish-green below; petioles 5–15 mm. long; stipules ovate-lanceolate, acuminate, 5 mm. long. *Inflorescence* terminal, flowers crowded. *Bracteoles* lanceolate to ovate-lanceolate, usually acute, 6–9 mm. long, 2–5 mm. wide, glabrous. *Pedicels* rather stout, up to 1.5 mm. long. *Calyx* glabrous; tube cupular, 1.3 mm. long; lobes broadly ensiform, acute, 1.6 mm. long, slightly keeled. *Corolla* white; tube 8 mm. long, cylindric in the lower half, cupular funnel-shaped above, glabrous except for a band 2 mm. broad of villous hairs about the insertion of the stamens within; lobes rotund-ovate, obtuse or subacute, 3–4 mm. long, minutely papillose within. *Stamens* inserted a little below the middle of the corolla-tube; filaments slender, 3.7 mm. long; anthers linear 1.8 mm. long, apices exserted. *Disk* of 2 fleshy, rounded lobes 5 mm. long and about twice as wide. *Style* slender; stigmas rather broader, linear, reaching to above the base of the filament. *Fruit* not seen.

Travancore High Range, Kalaar, in evergreen forest, 4750 ft., fls. May, *E. Barnes* 1560 (type in Kew Herb.), 1603 (spirit specimen in Kew Herb.), 1520, 1599.

Cheirostylis pauciflora *Lindl.* [Orchidaceae].

A Ceylon plant not previously reported from India.

Tinneveli District, below Nadugani, 1000 ft., fls. Dec., *E. Barnes* 1427.

Lagenandra toxicaria *Dalz.* var. **Barnesii** *C. E. C. Fischer*, var. nov. [Araceae]: spathae maturae limbo aperto tortoque, colore diverso a typo differt.

Stem 2.5 cm. diam. or a little more. *Leaves* up to 27 cm. long and 10 cm. wide; petioles up to 22 cm. long. *Peduncle* 1–11 cm. long, cream-coloured or very pale-brown. *Tube of spathe* cream-coloured or very pale-brown outside, deep crimson with darker vertical ridges within; limb outside somewhat glossy, greenish or flesh-coloured with purplish veins, inner surface spongy, pink to bright-crimson, margins darker. *Ovaries* in a cylindric mass, yellow with a network of reddish lines; a few whitish neuters present above the ovaries and a few bifid neuters on the spadix below the stamens.

Nilgiri Wynaad, near Nadgani, 3000 ft., fls. June, *E. Barnes* 1523 (type in Kew Herb.), 1605 (spirit specimen in Kew Herb.), 1524, 1588.

Arundinaria Walkeriana *Munro* [Gramineae].

Hitherto this Ceylon species appears only to have been collected once in S. India by Beddome in the Palni Hills, and then not in flower. Professor E. Barnes has found it in flower in Travancore. As the available descriptions are not very complete, I give the details below, taken from Professor Barnes' specimens.

Roots fibrous, apparently short, glabrous. Young *culms* olivaceous, 5 mm. diam. near the base, obtusely angled, glabrescent below, subtomentose upwards, clothed at the base with imbricate, chaffy, smooth, ovate, acute scales, 5 mm. long at the base, lengthening upwards and passing into culm-sheaths; lowest internode 9 cm. long, the next 7 cm. and rapidly diminishing in length upwards. *Culm-sheaths* papery, loose, broadly oblong, 3.2–3.5 cm. long, the edges below overlapping alternately to left and right, incurved and minutely pubescent at the base, apex rounded-truncate and ciliolate, limb of lower sheaths ovate, acute, 2 mm. long, becoming rigid, ensiform, pungent, 8 mm. long towards the apex, back shallowly ribbed, the uppermost densely hispid from tubercular bases, glabrescent lower down the stem. *Flowering culm* woody, 24 cm. long, 5 mm. diam. at the base, glabrous, smooth; fascicles of flowering branchlets from the nodes, the apex breaking up into a dense umbel of flowering branchlets 15–35 cm. long, the lowest branchlet shortest, the apical longest; branchlets concealed

by the overlapping keeled leaf-sheaths. Floral leaves 2-4 cm. long, 6-9 mm. wide.

Travancore, summit of Anaimudi, 8,800 ft., fls. May, E. Barnes 1591, 1593.

XIX—CONTRIBUTIONS TO THE FLORA OF SIAM.

ADDITAMENTUM XLVIII.*

Dimetra Kerr, gen. nov. (Oleaceae-Jasmineae); ab affini genere *Nyctanthe* Linn. habitu herbaceo, staminibus corollae tubi medio affixis, ovario alte bipartito distinguenda.

Herba erecta, perennis. *Folia* opposita, simplicia. *Inflorescentia* axillaris, pedunculata, subcapitata. *Calyx* alte partitus, lobis linearibus. *Corollae* lobi alabastro imbricati, dextrorsum obtegentes. *Stamina* 2, corollae tubi medio affixa. *Ovarium* superum, 2-loculare, ad basin 2-partitum; stylus filiformis, inter ovarii lobos positus, stigmatibus bifido; ovula in quoque loculo solitaria, erecta, prope basin affixa. *Fructus* dicoccus, coccis compressis monospermis; dehiscencia ignota; semina exalbuminosa; embryonis radícula infera, exserta.

Species unica.

Dimetra Craibiana Kerr, sp. nov.

Herba perennis, ad 20 cm. alta; caulis erectus, e caudice lignoso radicibus crassis numerosis praedito oriens, simplex vel pauciramosus, ramis ascendentibus, superne compressus, inferne 4-angulatus, angulis rotundatis, minute scabro-pilosus. *Folia* immatura tantum visa, integra, lanceolata vel elliptica, apice obtusa vel subacuta, minute apiculata, basi anguste cuneata in petiolum decurrentia, ad 4 cm. longa et 1.5 cm. lata, chartacea, siccitate supra viridia subtus pallide cinerea, supra breviter scabro-hispida, subtus crebre strigosa, costa supra leviter prominula albidula subtus ut nervi laterales prominente, nervis lateralibus saepius 3-paribus acute ascendentibus fere rectis marginem versus evanescentibus, nervis transversis obscuris; petiolus ad 0.5 cm. longus, strigosus, supra alte canaliculatus. *Inflorescentia* axillaris, ut videtur capitata, revera cymosa, e ramis perabbreviatis composita, circiter 9-flora, 0.5-1 cm. diametro; pedunculus 1.5-4 cm. longus, gracilis, striatus, strigosus; bracteae externae lineari-oblongae vel lineari-oblancoolatae, apice acutae vel acute acuminatae, ciliatae et adpresse pilosae, ad 8 mm. longae et 1.5 mm. latae; bracteae internae similes sed minores, circiter 6.5 mm. longae, 0.75 mm. latae. *Flores* sessiles vel subsessiles. *Calyx* alte 4-partitus, persistens, extra adpresse pilosus; tubus perbrevis, circiter 0.5 mm. longus; lobi anguste lineares, apice longe attenuati, 5.5-6.5 mm. longi, 0.25 mm. lati. *Corolla* hypocraterimorpha, alba nisi fauce lutea, extra sparse breviterque pilosa; tubus superne sensim ampliatus, intus velutinus, 6 mm. longus; lobi 4-5, rotundati, margine obscure crenulati, 4.5 mm. longi, 4 mm. lati. *Antherae*

* Continued from p. 106.



Dimetra Craibiana Kerr. 1, a fruiting plant, *nat. size*; 2, branch with older leaves, *nat. size*; 3, upper surface of leaf, $\times 4$; 4, under surface of leaf, $\times 4$; 5, bud with bract, $\times 4$; 6, corolla, $\times 2$; 7, corolla split open, $\times 2$; 8, calyx and gynoecium, $\times 6$; 9, longitudinal section of ovary and base of style, $\times 12$; 10, fruit, $\times 2$; 11, carpel laid open, $\times 2$; 12, embryo, $\times 2$.

oblongae, breviter apiculatae, 2 mm. longae, lateraliter dehiscentes ; filamenta circiter 1 mm. longa. *Ovarium* alte bipartitum, apice plano-convexum, glabrum, circiter 1 mm. altum ; stylus 3 mm. longus, stigmatibus lobis 0.4 mm. longis. *Fructus* immaturus tantum visus, bicoccus ; cocci compressi, valde recurvati, late elliptici, breviter obtuseque apiculati, crebre striati, molliter pilosi minuteque glandulosi, explanati circiter 9 mm. longi et 6 mm. lati, 0.5 mm. crassi ; semen compressum, plano-convexum, 5 mm. longum, 2.5 mm. latum ; embryonis cotyledones planae, radícula breviter exserta.

Udawn, Nawng Bua, circiter 200 m., in open deciduous forest, *Kerr* 8611 (type). Nakawn Panom, Muk Dahan, circiter 200 m., rock crevices in open deciduous forest, *Kerr* 8411.

The description of the flower has been drawn up from *Kerr* 8411.

The closest alliance of this proposed genus is clearly with *Nyctanthes*, which it resembles in many points. In *Nyctanthes*, however, the partition of the carpels does not occur till the fruit is ripe, whereas in *Dimetra* it is already present in the flower. In its herbaceous habit and linear calyx lobes *Dimetra* shows some resemblance to *Menodora*, which differs in the number and position of its ovules. The name *Dimetra* has been derived from δι-μήτρα, double uterus, in allusion to the form of the ovary.

***Linociera calcicola* Kerr** [Oleaceae–Oleaceae] ; ab affini *L. spicifera* Ridley foliis floribusque multo minoribus recedit.

Arbor parva, circiter 5 m. alta ; ramuli hornotini subquadrati, minute velutini, cortice lenticellis parvis papuliformibus copiose obsito obtecti ; ramuli annotini teretes, glabrescentes, cortice pallide cinereo lenticellis obscuris obtecti. *Folia* late elliptica, vel ovata, basi cuneata, apice breviter obtuseque acuminata, subcoriacea, siccitate supra viridi-brunnea, subtus parum pallidiora, glabra, costa supra prominula subtus prominente, nervis lateralibus 6–8-paribus supra subtusque obscuris vel parum prominulis ; petiolus minute velutinus, supra canaliculatus, 3–4 mm. longus. *Inflorescentia* axillaris, conferta, sessilis, saepius 3-flora, foliis multo brevior ; bracteae ovatae, dense cinereo-pubescentes, circiter 1 mm. longae et latae. *Flores* sessiles. *Calyx* 4-partitus, extra dense cinereo-pubescentes ; lobi obtusi, 1 mm. longi. *Corolla* glabra ; tubus 1.5 mm. longus ; segmenta linearia, margine plana, 4 mm. longa et 0.5 mm. lata. *Stamina* basi corollae inserta ; antherae obtuse mucronatae, 0.75 mm. longae ; filamenta 0.75 mm. longa, basi late complanata. *Ovarium* ovoideum, 2 mm. altum ; stigma sessile, bilobum. *Fructus* immaturus ellipsoideus, apiculatus, 4 mm. longus.

Trang, Kaw Libong, 100 m., on rocky limestone hill, *Kerr* 19077 (type). Krabi, Kaw Pipi-le, 100 m., rocky ground on limestone hill, *Kerr* 18922.

In its habit this small tree recalls some of the species of *Memecylon*. The description of the fruit, of which only immature states have been seen, has been drawn up from *Kerr* 18922.

***Linociera eriorrhachis* Kerr** [Oleaceae-Oleineae]; *L. caudifoliae* Ridley affinis, sed rhachi dense pubescente facile distinguenda.

Arbor (?) ramulis gracilibus glabris juventute leviter compressis mox teretibus cortice pallide cinereo lenticellis ellipticis sparse obsito obtectis. *Folia* elliptica vel oblongo-elliptica, basi cuneata, apice caudato-acuminata, margine interdum parum recurva, ad 8.3 cm. longa et 2.7 cm. lata, chartacea, glabra, costa supra prominula subtus prominente, nervis lateralibus 6-8-paribus supra obscuris subtus prominulis leviter arcuatis et prope marginem anastomosantibus; petiolus rugulosus, supra canaliculatus, glaber, 3-4 mm. longus. *Inflorescentia* axillaris, foliis multo brevior, simpliciter racemiformis vel interdum e basi bifurcata, 6-12-flora, 7-16 mm. longa; pedunculus communis nullus vel perbrevis; rhachis subquadrata, sicut bracteae dense pubescens; bracteae late ovatae, circiter 1 mm. longae et latae; pedicelli subnulli vel ad 1 mm. longi, pubescentes. *Calyx* pubescens, 4-lobatus; tubus 0.5 mm. longus; lobi triangulares, subacuti, 0.5 mm. longi. *Corolla* glabra; tubus 0.75 mm. longus; segmenta linearia, apice leviter cucullata, 2.25 mm. longa, 0.5 mm. lata. *Stamina* subsessilia, antheris oblongis apice rotundatis 1 mm. longis et 0.75 mm. latis. *Ovarium* ovoideum, glabrum, 1 mm. altum; stigma sessile, inaequaliter bilobum, lobis erectis. *Fructus* ignotus.

Prachau, Hui Yang, *Put* 3242.

***Linociera microbotrya* Kerr** [Oleaceae-Oleineae]; ab affini *L. ramiflora* (Roxb.) Wall. inflorescentia multo brevior, fructu duplo majore distinguitur.

Arbor parva, circiter 8-15 m. alta, omnino glabra, ramulis juventute compressis cortice pallide cinereo lenticellis parvis pustulatis crebre obsito obtectis. *Folia* elliptica vel oblanceolata, basi in petiolum sensim attenuata, apice breviter acuminata, ad 20 cm. longa et 8.5 cm. lata, subcoriacea, siccitate supra nitidula viridi-brunnea, subtus opaca paullo pallidiora, costa supra concava subtus valde prominente, nervis lateralibus 12-20-paribus, supra subconspicuis subtus prominulis patulis prope marginem arcuatis anastomosantibusque, nervis transversis obscuris; petiolus ad 5 cm. longus, supra plano-concavus, basin versus siccitate nigrescens. *Inflorescentia* axillaris, vulgo e foliorum delapsorum axillis orta, paniculata, densiflora, petiolo brevior, ad 3 cm. longa et lata; pedunculus communis subnullus vel ad 5 mm. longus, minute lepidotus; bracteae inferae oblongae, minute lepidotae, ad 4 mm. longae; bracteae superae minores, ovatae, minutissime ciliatae; pedicelli breves, quadrangulares, ad 0.5 mm. longi. *Calyx* glaber, lobis triangularibus 1 mm. longis. *Corolla* glabra, 2 mm. longa; lobi oblongi, 1.5 mm. longi, margine

involuti. *Stamina* subsessilia ; antherae oblongae, apice obtusae, 0.75 mm. longae. *Ovarium* conicum, glabrum, 0.8 mm. altum, stigmatibus minuto erecto. *Fructus* ellipsoideus, epicarpio minute lepidoto siccitate rugoso, ad 2.5 cm. longus et 1 cm. latus.

Saraburi, Muak Lek, circiter 200 m., evergreen scrub, *Kerr* 9060 (*type*) ; Krat, Dan Chumpon, under 50 m., evergreen forest, *Kerr* 17658.

The fruit has been described from *Kerr* 17658.

***Linociera procera* Kerr** [Oleaceae-Oleineae] ; ab affini *L. laxiflora* (Bl.) Knobl. foliis majoribus, inflorescentia ampliore et floribus majoribus distinguitur.

Arbor excelsa, circiter 25 m. alta ; ramuli juventute teretes vel leviter compressi, glabri, cortice nigro-brunneo lenticellis ellipticis pallide cinereis parce obsito obtecti. *Folia* elliptica, basi cuneata, apice subacuta, interdum leviter acuminata, ad 14.5 cm. longa et 5.2 cm. lata, chartacea, siccitate supra nitida nigro-brunnea, subtus opaca fulvo-brunnea, glabra, pagina utraque minute crebreque verruculosa, costa supra parum impressa subtus prominente, nervis lateralibus utrinque 7-9 supra subconspicuis subtus prominulis patentibus leviter arcuatis et prope marginem obscure anastomosantibus ; petiolus supra concavus, glaber, 1.5-3 cm. longus. *Inflorescentia* axillaris, saepius e foliorum delapsorum axillis orta, paniculata, multiflora, floribus sessilibus ad ramulorum apicem confertis, glabra nisi ramulis ultimis minute puberulis, ad 9 cm. longa et 5 cm. lata ; bracteae ramos inferos subtendentes subfoliaceae, obovatae, petiolatae, glabrae, ad 7 mm. longae et 2 mm. latae ; eae ramos superos subtendentes subulatae, minute puberulae, ad 5 mm. longae ; bracteae verae triangulares, obtusae, pubescentes, circiter 1 mm. longae et 0.75 mm. latae. *Calyx* dense pubescens, 4-partitus ; lobi ovati, obtusi, 1 mm. longi. *Corolla* glabra ; tubus 0.75 mm. longus ; segmenta erecta, anguste triangularia, subacuta, margine involuta, 3 mm. longa, basi 1 mm. lata. *Stamina* basi tubi inserta, subsessilia ; antherae oblongae, apice truncatae vel emarginatae, 1.75 mm. longae. *Ovarium* ovoideum, glabrum, vel interdum apicem versus pilis paucis praeditum, 2 mm. altum ; stigma sessile, minute bilobum. *Fructus* ignotus.

Krat, Kao Kuap, circiter 700 m., evergreen forest, *Kerr* 17767.

***Linociera sutepensis* Kerr** [Oleaceae-Oleineae] ; species *L. ramiflorae* (Roxb.) Wall. affinis, a qua foliis majoribus, fructu globoso nec ellipsoideo distinguitur.

Arbor circiter 6-8 m. alta, glabra ; ramuli subquadrati, cortice pallide cinereo lenticellis parvis copiose obsito obtecti. *Folia* elliptica, oblongo-elliptica vel oblanceolata, basi anguste cuneata, apice sensim acuminata, ad 25 cm. longa et 9 cm. lata, glabra, siccitate pagina utraque crebre minuteque verruculosa, costa cum nervis lateralibus supra impressa subtus valde prominente, nervis transversis supra obscuris subtus prominulis, nervis lateralibus

utrinque 8–14 subparallelis prope marginem arcuatis anastomosantibusque ; petiolus 1·5–3·5 cm. longus, supra concavus. *Inflorescentia* axillaris, paniculata, valde ramosa, divaricata, multiflora, glabra, ad 20 cm. longa et 22 cm. lata ; pedunculus communis 3·5–7·5 cm. longus ; bracteae patentes, anguste triangulares vel subulatae, minute parceque ciliatae, 2·5–3·5 mm. longae ; bracteolae ovatae, minute ciliatae, 1·5 mm. longae et latae. *Calyx* 4-partitus ; lobi ovato-triangulares, subacuti, minute ciliati, 1·5 mm. longi et 0·75 mm. lati. *Corolla* alba, glabra ; tubus circiter 1·5 mm. longus ; segmenta oblonga, apice obtusa et cucullata, margine involuta, patentia vel parum recurva, 2·5 mm. longa et 1 mm. lata. *Antherae* subsessiles, 1 mm. supra basin tubi insertae, 1·2 mm. longae et 0·8 mm. latae. *Ovarium* ampulliforme, glabrum, 2 mm. altum ; stigma sessile, obscure bilobum. *Fructus* plus minusve globosus, 1·5–2 cm. diametro, epicarpio siccitate minute rugoso, pericarpio toto 1·5 mm. crasso.

Doi Sutep, 900 m., evergreen forest, *Kerr* 1584, 1584B (*type*) et 2603.

The impression of the nerves above and their prominence below, well marked on old leaves, is much less so in younger leaves. The description of the fruit has been drawn up from *Kerr* 2603.

Linociera velutina *Kerr* [Oleaceae–Oleinae] ; species *L. macrocarpae* Bl. affinis, foliis pro rata latoribus subtus velutinis, inflorescentia magis pubescente differt.

Arbor (?) ramulis juventute minute puberulis cortice nigro-brunneo lenticellis parvis pallidis sparse obsito obtectis. *Folia* oblanceolata vel obovata, basi in petiolum sensim attenuata, apice obtusa vel breviter obtuse acuminata, margine leviter revoluta, ad 18 cm. longa et 9 cm. lata, coriacea, supra glabrescentia siccitate fusca, subtus pallide cinerea et minute velutina praesertim secus costam nervosque, costa supra impressa subtus prominente, nervis lateralibus utrinque 7–12 supra impressis subtus prominentibus prope marginem arcuatis et obscure anastomosantibus ; petiolus minute puberulus, supra complanatus, 1·5–3 cm. longus. *Inflorescentia* subterminalis vel axillaris, interdum ex axillis foliorum delapsorum orta, paniculata, floribus ad apicem ramulorum confertis, omnino pubescens, ad 8 cm. longa et 5 cm. lata ; bracteae ramos subtendentes foliaceae, cito deciduae ; bracteae verae anguste triangulares vel lineares, 0·75–1 mm. longae. *Calyx* dense cinereo-pubescent, 4-partitus ; lobi triangulares, subacuti, 1·25 mm. longi. *Corolla* glabra ; tubus 0·5 mm. longus ; segmenta angustissime triangularia, acuta, margine involuta, 5·5 mm. longa, basi 1 mm. lata. *Stamina* basi tubi inserta ; antherae oblongae, breviter obtuseque mucronatae, 1·5 mm. longae ; filamenta lata, 0·25 mm. longa. *Ovarium* ampulliforme, 0·8 mm. altum, superne ut basis styli parce pilosum ; stylus circiter 0·5 mm. longus, in ovarium sensim dilatatus ; stigma minutum, bilobum. *Fructus* ignotus.

Korat, Ban Chum Seng, *Put* 2816.

Myxopyrum confertum Kerr [Oleaceae-Oleineae]; *M. smilacifolio* Bl. affine, sed inflorescentia multo brevior, floribus minoribus differt.

Frutex scandens, inflorescentia excepta glaber, ramulis tetragonis. *Folia* elliptica vel oblongo-elliptica, basi cuneata, interdum parum rotundata, apice sensim attenuata, acuta, margine integra vel superne obscure dentata, 10–16 cm. longa, 3.4–5 cm. lata, coriacea, glabra, supra subnitida, trinervia vel plus minusve impariter triplinervia, rarius 5-nervia, nervis subtus prominentibus, siccitate rete venularum supra subtusque manifesto; petiolus 7–10 mm. longus, supra anguste canaliculatus. *Inflorescentia* axillaris, multiflora, conferta, subsessilis, circiter 8–10 mm. longa, rhachi ut ramuli bracteae pedicellique minute puberula; bracteae lanceolatae, acutae, ad 2.5 mm. longae; pedicelli brevissimi. *Flores* virides; calyx 4-partitus, extra minute puberulus, lobis triangularibus acutis 0.5 mm. longis; corollae tubus 0.5 mm. longus, lobis obtusis apice leviter incurvis circiter 0.5 mm. longis. *Stamina* inclusa, antheris subrotundis 0.75 mm. diametro. *Ovarium* globosum, 0.3 mm. altum; stigma minutum. *Fructus* ignotus.

Muang Pan, Doi Duan, circiter 500 m., mixed forest by stream, Kerr 5099.

XX—MISCELLANEOUS NOTES.

Ripon Professorship.—On approaching India the Director was invited to accept the Ripon Professorship of the Indian Association for the Cultivation of Science for the year 1938. This Association is the oldest non-official public institution founded in India with the sole object of promoting the study of science, and the Professorship commemorates the name of the Viceroy, the Marquess of Ripon.

The Director accepted the invitation, and delivered a course of three lectures in Calcutta in January 1938.

Horticultural Appointments in the Sudan.—We learn with interest that Mr. J. ROBBIE, who left Kew in 1927 to take up the appointment of Superintendent of Government Gardens, Khartoum, has been promoted to the newly-created post of Inspector of Horticulture under the Sudan Government, as from 1st January 1938. Mr. W. J. CORKHILL, Assistant Superintendent at the Gardens, is now acting as Superintendent. Mr. Corkhill has held the post of Assistant Superintendent since leaving Kew in 1935.

ERNEST GOULDING.—We regret to announce the death on the 15th February, 1938, of Dr. Ernest Goulding, D.Sc., F.I.C., formerly Vice Principal of the Plant and Animal Products Department of the Imperial Institute. Dr. Goulding retired from this post on reaching the age limit in 1935. His connexion with the

Imperial Institute extended over a long period (39 years) during which time he took an important part in the scientific and technical work on Empire raw materials both as regards laboratory investigations and intelligence service.

Dr. Goulding was a recognised authority on fibres, his work covering a wide diversity of fibrous materials. He played a leading part in the investigations of cotton during the pioneer stages of cotton cultivation in the Colonies, and was author of a useful handbook "Cotton and other Vegetable Fibres." In later years, as Secretary to the Advisory Committee on Vegetable Fibres, a post which he held from the inception of the Committee in 1926, he contributed largely to the success of work which has had a wide influence on the production and the extension of uses of Empire fibres, particularly of sisal in East Africa. In 1936 he gave the Mather Lecture at the Textile Institute, his subject being the investigation of textile fibres of vegetable origin during the last 40 years.

The Present Day Rock Garden.*—This volume is designed as complementary to Reginald Farrer's well-known "English Rock Garden." It not only brings the latter work admirably up-to-date but it goes further and introduces the reader to a somewhat bewildering array of plants of which he has probably never previously heard: indeed, it might be suggested that the "Rock Garden of the Future" would have been a more fitting title! As a compilation it is a very big piece of work and will be of great value to all those concerned with rock gardening.

Where full descriptions are given, these are extremely good, but it is doubtful whether lengthy lists of bare names and synonyms are really desirable in a work of this kind. They are certainly thereby made available within the covers of one book, but it is of doubtful use to anyone taking up the cultivation of, let as say, Gentians, Primulas or Alliums, to be confronted with long lists of names, without descriptions, added as "possibilities," "near synonyms," and "merely useful species."

The author has taken great pains to make the botanical side of his work accurate and up-to-date, and the adoption of his names in trade lists and gardens generally will be a great help in clearing up a number of long-standing errors and confusions, *e.g.*, *Penstemon Roezlii*, *P. rupicola* and *Gentiana Purdomi*.

The illustrations, which are excellent and well chosen, add greatly to the value of the work and will certainly act as a spur to collectors searching for worthy additions to our gardens.

DR. T. A. SPRAGUE adds the following remarks on Dr. Clay's long introduction.

The Introduction to this volume is perhaps more revealing than the author either realized or intended. Dr. Clay seems to be

* By Sampson Clay, M.A., Ph.D. T. C. & E. C. Jack, Ltd., London, 1937. Pp. 681. Illustrated. Price 31s. 6d.

primarily a horticulturist, equipped with a general knowledge of certain branches of botany, but lacking in comprehension of the nature and aims of taxonomy. The result is a curious medley of shrewd remarks, trite observations and ill-informed criticism, justifying his statement that "more nonsense has been talked and written about the species by people who should have known better, than about any other scientific term." The following is a sample of the author's style:—

"The prime function of a name is to provide a convenient handle for the object to which it is attached. There is no reason why plant names should lose sight of their *raison d'être* in order to be the sport and plaything of controversial and individual opinions. Dispassionately considered, the person who identifies and names plants has a doubtful claim to be called scientist at all (although curiously enough to the man in the street he is *the* botanist); he ought to be less concerned with the pursuit of pure knowledge than with the ordering and labelling of material for the use of scientists and practical men. If a taxonomist happens to read here, I trust that he will not see cause for offence in this point of view—like all technicians he is a quite indispensable person, frequently more clever than the people for whom he works. The point is that taxonomy in the strict sense is, or should be, distinct from nomenclature. If it amuses a man to observe and speculate (and sometimes even experiment, thereby becoming an ecologist or geneticist or cytologist) as to the relationships of families and genera, it hurts no one, and may interest some. If he discusses the features to be considered most important in classifying particular groups of plants, and indicates his opinions, no harm is done. But if he alters names and moves boundaries for the sake of more perfect accord with his own ideas, the *important people*, the *users* of the names, suffer. Our knowledge of the actual descent of plants is very limited indeed, and a mere binomial is in any case incapable of crystallizing such information: there is no reasonable escape from the proper concept of the species as above all a unit of convenience."

If Dr. Clay's remarks are intended to be taken seriously and are not merely "letting-off steam" at the conclusion of a laborious piece of compilation, it is clear that he does not realise that the naming of plants is intimately bound up with their classification and that many changes in the names of plants are due to taxonomic discoveries whose mere publication and verification is sufficient to bring conviction to the unbiassed. The suggestion that such discoveries should be ignored in nomenclature, thus stifling scientific progress, is not what one would have expected from a scientist even if he happens also to be a practical man. Taxonomy covers more than the technical process of identifying and naming plants already classified.

Dr. Clay's view seems to be that the classification of plants, unless phylogenetic considerations are involved, is not a scientific

activity. It would appear that he has been misled by the superficial resemblance between botanical "binomials" and human "names" to the rather common but quite erroneous view that the "naming" of an individual plant is comparable to the "naming" of an individual human being. A little consideration shows, however, that a botanical binomial is a *class* name, whereas a human name is a *proper* name applicable to one particular individual. If a comparison is to be made, the plant's binomial corresponds not to "John Smith" but to such class names as "lawyer," "Polynesian," "brachycephalic," etc. Individual names bear no direct relation to the attributes of the bearer, whereas class names are a convenient method of summarising such attributes. A taxonomist, then, allocates an individual plant to a particular group because of certain attributes of that plant. Now, one of the most characteristic and fundamental activities of science is the grouping into classes of individual objects which have certain attributes in common. The naming of plants by a taxonomist, therefore, must be regarded not only as a "scientific activity," but as an activity fundamental to all other scientific botanical work. Whether or not phylogenetic considerations are taken into account may alter the orientation of the activity, but it in no way affects its scientific status.

How to Grow Roses.*—The experience of the authors of this book, whose names are household words amongst rose growers in America, ensures its value and interest to rose lovers. That it has become necessary to publish an enlarged and entirely rewritten eighteenth edition is evidence of the increasing popularity of the rose in America.

The book consists of one-hundred and ninety-two pages and is divided into twelve chapters, each dealing with a phase in the growing of roses in America, such as "How to Obtain (propagate) Roses," "How to Fight Rose Pests," "How to Prune Roses" etc. For a book of its size and price, "How to Grow Roses" is exceptionally well illustrated with thirty-two coloured plates and thirty-one half-tone illustrations, in addition to numerous black and white sketches of practical work in the garden, including the right and wrong methods of digging the ground, planting, pruning, etc.

Unlike most books dealing with gardening in America, the subject matter of which is almost entirely applicable to the country of origin, there is much of interest and value to rose growers in this country. No keen cultivator of roses in this country would regret the purchase of this very cheap and readable book.

* By J. Horace McFarland and Robert Pyle. Published by The MacMillan Company, New York (eighteenth edition), 1937. Price 4s. 6d.

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